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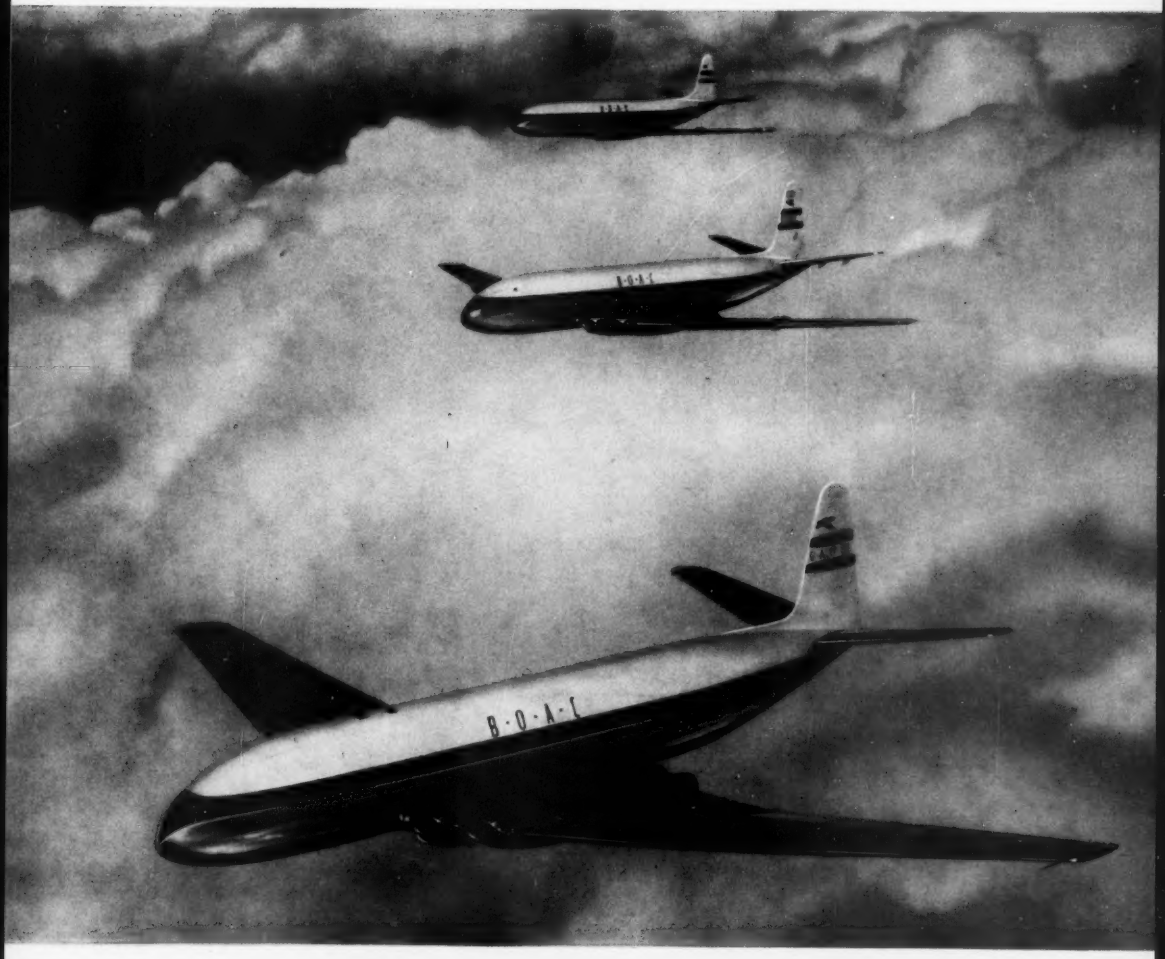

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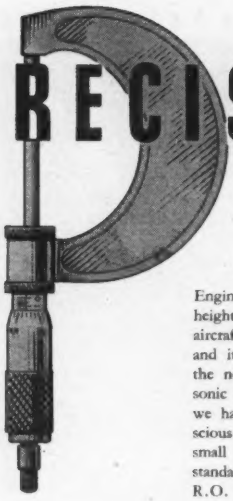

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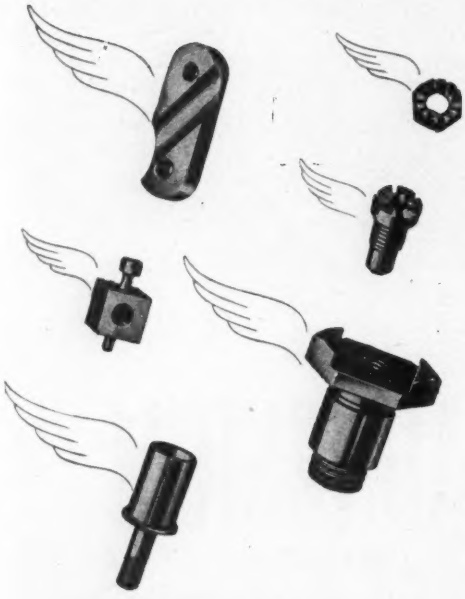

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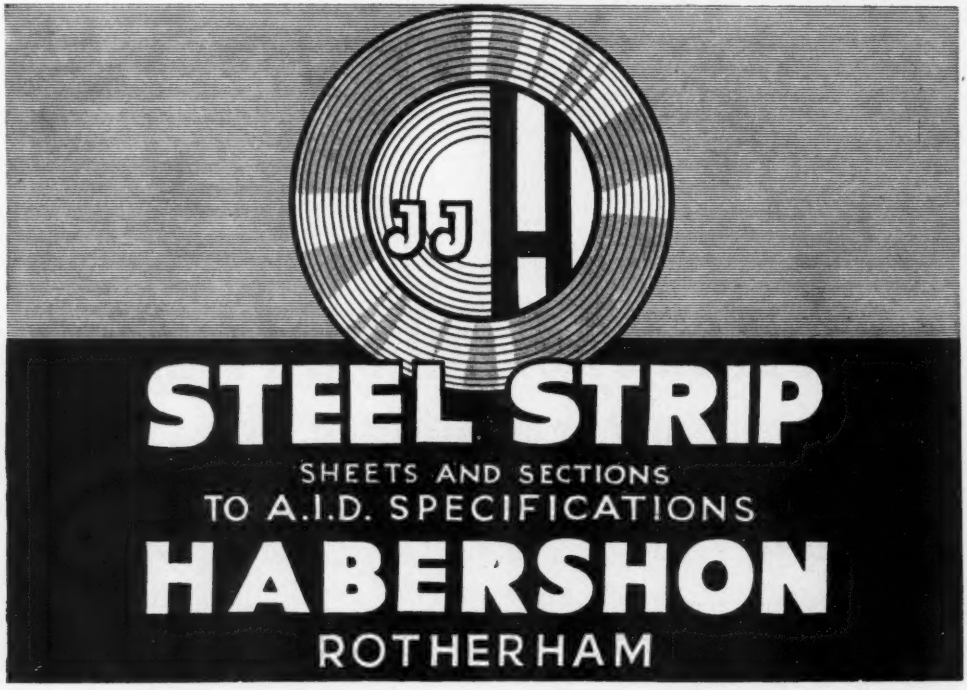

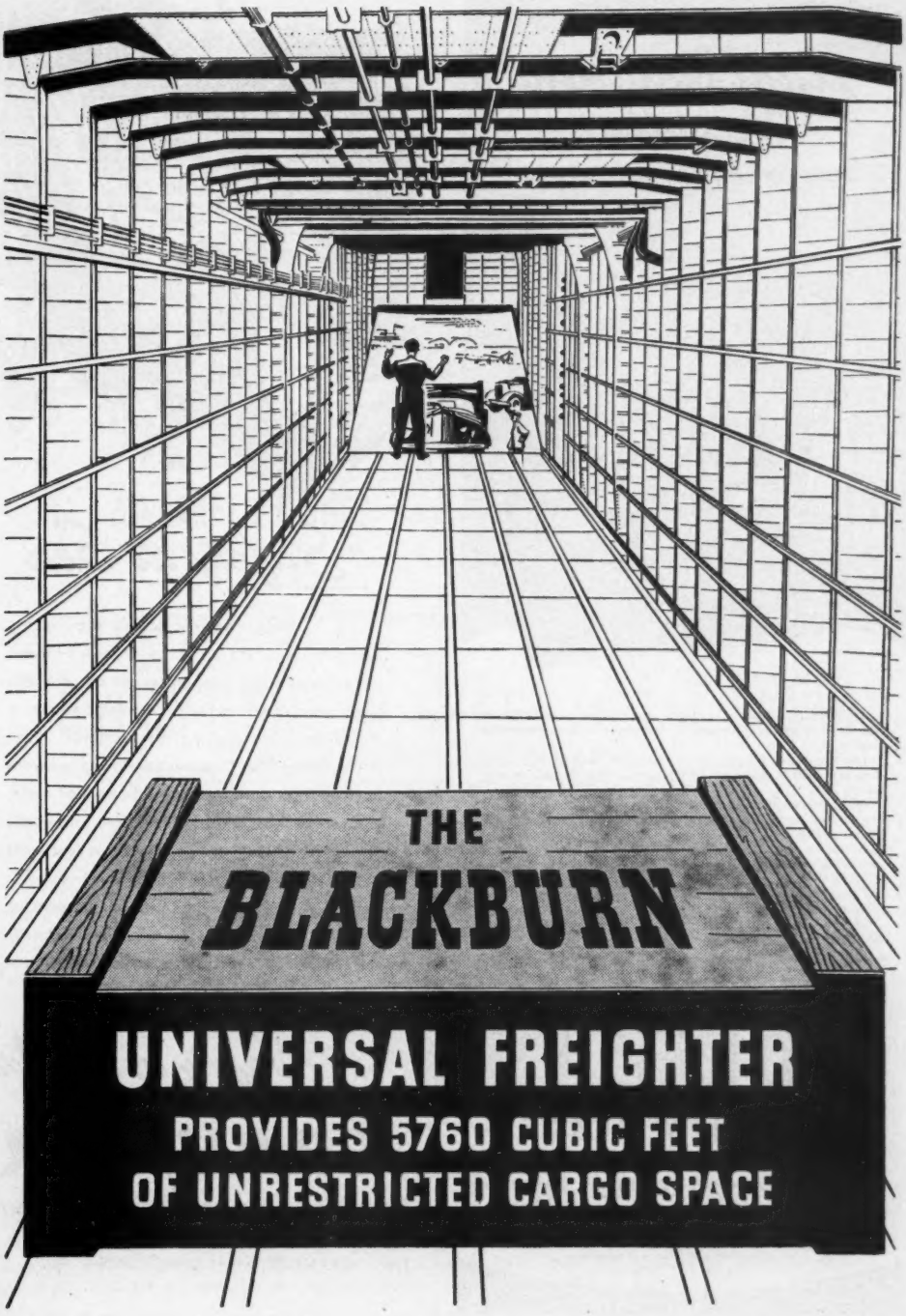
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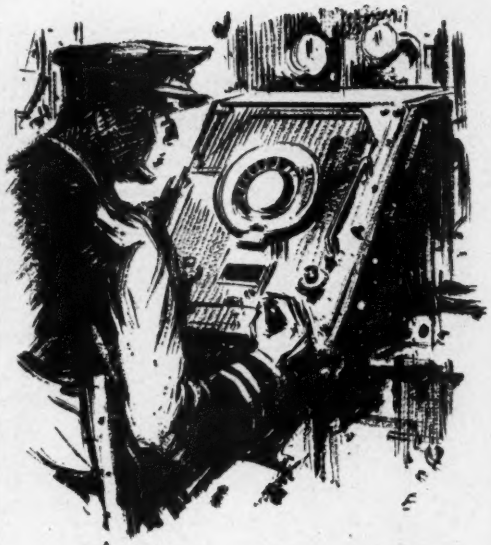

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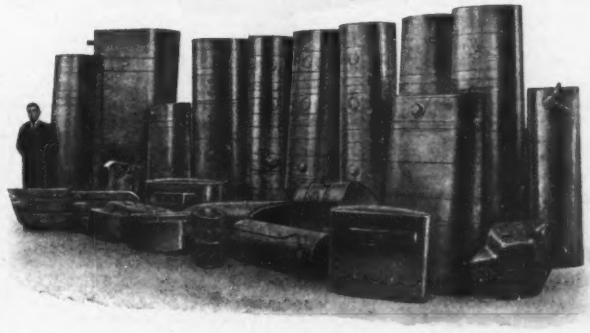

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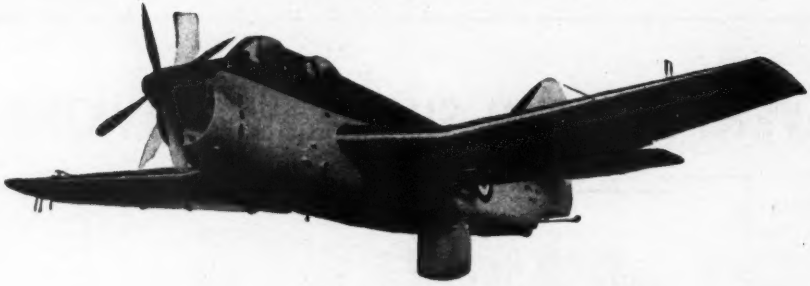

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The Question of Noise

THE time has come, we feel, to express a firm opinion upon the subject of noise—a major irritant which should and could be reduced in these trying times and one which in its unexpected power to cause fatigue adds yet another drain upon everyone's reserves of energy. We are concerned here with the noise inside and outside aircraft, though not with all aircraft, and certainly not with those for which (so far as extraneous noise is concerned) there is no practical method of silencing—current types of airliner, for example. We sympathize with people living near airfields, but feel towards them as towards the victims of road accidents. Everyone acknowledges that cars ought not to run into the backs of unlighted stationary lorries, but they regularly do, and mere men apparently cannot stop them doing so.

But there are some sorts of aircraft in which noise and the associated vibration can be much reduced without any great trouble. Helicopters, for example, would suffer little or no reduction in performance if effective silencers were fitted to their engines. Efficient silencers are rather bulky, but fortunately they need not be heavy and are applicable to slow aircraft. Unlike the helicopter, high-performance aircraft cannot tolerate bulk, and "compressed" silencers invariably lead to exhaust back-pressure and loss of performance. For these, and particularly for the new turbine-powered types, a solution is difficult to find.

There is a current—rather unkind—story from Korea that troops taken into battle in helicopters have settled down to the fight at once, because they are both pre-deafened and innured to vibration. Let us, then, have silenced helicopters for a start.

A second type of aircraft for which silencing is overdue is the light cabin-type machine. For this, a long exhaust pipe—there have been several good examples in the past—releasing the exhaust well behind the cabin can halve the noise in the interior from this source, and there need be no appreciable effect on performance. If, in addition, the flooring and bulkhead are properly sealed and a sheet of one or other of the proprietary soundproofing compounds is introduced at the right place, a further considerable improvement in cabin comfort is noted—to this we can testify from experience with one of the best-known British light aircraft so modified abroad.

Noise reduction in many other types of aircraft presents real difficulties which, no doubt, will one day be solved by their designers and other specialists much cleverer than us; but we ask now how much longer the private pilot must put up with the fatigue and misery of noise which, if it emanated from his new car, would assuredly persuade him to sell it—even in these days.

Australia's Choice

NORTH AMERICAN Sabre jet fighters are to be built in Australia. Certainly it would be idle to deny that this news comes as a disappointment, for it had been hoped that an advanced type of Hawker fighter would pass into production in the Commonwealth; but the choice must be judged a sagacious one. In the first place, no proven British fighter of the Sabre's calibre could possibly be passed into production so expeditiously and, as for the qualities of the Sabre itself, the most ardent devotees of British fighters are now agreed that it is a machine of exceptional merit, reconciling an extremely high Mach number with tractability and a better climbing and altitude performance than formerly credited. Like almost any aircraft, it has its shortcomings, not the least being its armament of six 0.5in guns. Adaptation for heavier weapons would entail extensive modifications (if, indeed, it were possible at all), but it may be noted that in America the "half-inch" guns are being supplemented by air-to-air rockets.

One cause for congratulation is that British turbojets are specified, and, while the chosen type has not been named, it is evident that, just as the Canadian-built Sabres have been adapted to take the Orenda, the Australian machines might be powered with the Rolls-Royce Avon, to be built in Australia for the Canberra bomber.

G. Geoffrey Smith, M.B.E.

IT is with deep regret that *Flight* has to record the death, on Friday, June 29th, of its editorial director, G. Geoffrey Smith, M.B.E. He passed away peacefully at his home at Radlett, Herts, after a brief internal illness which rapidly became critical.

Geoffrey Smith was also responsible for editorial direction of *The Autocar, The Motor Cycle, Motor Transport, The Automobile Engineer, Aircraft Production, Bus and Coach, British Plastics* and *The Architect and Building News*, and was associated with seven other Iliffe journals. He was a director of Iliffe and Sons, Ltd., from 1923; advisory editor of *Flight* from 1927 until 1934, and then, on its acquisition by Iliffe's, a director of Flight Publishing Co., Ltd.; a director of the Louis Cassier Co. from 1943; and a director of Associated Iliffe Press from 1945.

Apart from his professional interests, Geoffrey Smith was prominent in public life, particularly in the City of London, of which he was a Freeman; he was a Liveryman of the Worshipful Company of Coachmakers and Coach Harness Makers, and a Life Governor of the Great Ormonde Street Hospital for Sick Children.

Few men could have been better qualified to guide the destinies of journals concerned predominantly with mechanican transport. Born 66 years ago at Newark, Notts, he spent his formative years in the Midlands during the time that the British motor industry was putting forth its first roots there. After an engineering apprenticeship with Ransome and Marles, Ltd., he secured a post on the staff of *The Motor Cycle*, then published in Coventry under the managing editorship of H. Walter Staner and ownership of Mr. Edward Iliffe (now Lord Iliffe).

This was in 1904; by 1912, at the age of 27, he had himself become editor. It was now that he began to form friendships that were to last during the whole lifetime—pioneer automobile industrialists were quick to recognize a kindred spirit.

During the early years of the First World War Geoffrey Smith organized the recruitment of over 10,000 motor cycle despatch riders, mobile machine-gunners and armoured car drivers. This work earned him a letter of thanks from the Army Council, and in 1917 he was made an M.B.E. He had always taken an interest in aircraft, and the war gave him an opportunity to transform this interest into a practical, daily acquaintanceship: with his knowledge of internal-combustion engines as one of his recommendations, he was commissioned in the R.F.C. and was thereafter engaged, with the rank of captain, on various technical duties in connection with aircraft power units.

After the war, on returning to Iliffe's—who were soon to move their H.Q. to London—he took over control of *The Motor Cycle, The Autocar* and *Motor Transport*, and all three journals began to gain steadily in circulation and influence under his guidance. He also became responsible for *The Automobile Engineer* and, later, *Bus and Coach*.

It was during this period that he assumed—in 1934—the managing editorship of *Flight*, after acting for several years in a consultative capacity to the former proprietor, the late Stanley Spooner. From the Coventry days to the end, incidentally, H. J. Jarvis was his personal assistant.

Just as he had served the cause of mechanized transport at the outset of the 1914-18 war, so did he assist aviation in the second world struggle, but this time mainly by his encouragement and support of the new science of jet propulsion—regarded in some quarters as little more than an inventor's pipe dream. Apart from the few technicians directly concerned, he was among the first to recognize the potentialities of the gas turbine, not only for aircraft, but in other spheres as well. His writings, lectures and broadcasts, though necessarily circumscribed during the war period by the need for secrecy, did much to awaken the public to the immense possibilities of this new prime mover. It may be added that in some quarters—often quite responsible ones—his predictions were received with something approaching ridicule; but he refused to be discouraged, and very soon events were to prove him right.

From 1939 onwards he was a member of the Inter-Service Press Committee on Defence Notices; later in the war he was chairman of the Technical and Trade Press Advisory Panel of the Ministry of Labour and National Service, and of the Ministry of Production Journal, *The Production and Engineering Bulletin*. Membership of five other committees directly connected with the war effort also claimed his time. In 1944, at the invitation of the Government, he spent nine months in America publicizing Britain's technical achievements and the benefit that would accrue from mutual aid in the production field; aircraft power units were among the most important items in his terms of reference for this tour.

He was the author of *Gas Turbines and Jet Propulsion*, a standard work now in its fifth edition. He was also responsible for *The Modern Diesel* (14 editions), and, at the request of the British Council, for the monograph on Sir Henry Royce, issued in various languages.

Last year Geoffrey Smith again visited America and attended the Aeronautic Meeting of the Society of Automotive Engineers, whose members he was invited to address on the subject of gas-turbine progress in Great Britain. He was, incidentally, a European associate and member of the Co-ordinating Committee of the Gas Turbine Power Division of the American Society of Mechanical Engineers.

Except for occasional airline travel, his executive duties during recent years did not leave him much time for flying; nevertheless, he enjoyed it on occasions. His last flight was made in a D.H. Heron in the Isle of Man last month, with Mr. Peter Masefield, chief executive of B.E.A., at the controls.

If the wider world of motoring, flying and engineering has lost a pioneer enthusiast, we at Dorset House are deprived of a friend. "G.S." (as we always knew him) treated his work as a hobby to be pursued with unfailing zest. Personal success never led him to assume an aloof manner, and he remained freely approachable by the most junior men under him; he was ready at any time to discuss any aspect of the job as a team-mate rather than as a superior. With these characteristics went a "nose for news"—an uncanny ability to recognize, long before anybody else, that some seemingly insignificant technical development would in due course set the whole world talking.

Geoffrey Smith leaves a widow, two sons by a previous marriage—his first wife died in 1927—and a daughter. The elder son is W/C. Maurice Smith, D.F.C., present editor of *Flight*; the younger, Capt. A. G. Smith, served with distinction in a Royal Marines Commando unit. Our readers will, we know, wish to join us in expressing sincere sympathy to them in their loss.

The funeral took place at Holy Trinity Church, Coventry, on Wednesday last, July 4th.

A six-jet glider — the Emouchet Escopette, with S.N.E.C.M.A. pulsejets—is the target for skirmishing cameramen. Two of these intriguing little machines (the second example had four jets) opened the main flying programme on a noisy, but stimulating, note.

Culmination of the Salon: Spectacle and Variety in Paris

Illustrated with "FLIGHT" photographs

THE LE BOURGET FÊTE

THAT the exhibits in the Grand Palais represented only a small proportion of the offerings at the 19th International Aeronautical Salon, concluded in Paris last Sunday, has been remarked in our previous reports. The organizing authorities themselves were fully conscious of the deficiencies at the Palais, but answered criticism with promises of far richer fare at what they were pleased to style the *Grande Fête Aérienne Internationale*. This "manifestation"—at Le Bourget airport on Sunday, July 1st—was to mark the closing of the Salon and was designed not only to acquaint the French people with the newest products of their own aircraft industry, but to bring together individual aircraft and formations of several nations.

The list of participants was an alluring one, both in scale and scope, and we took the opportunity of visiting Le Bourget on the preceding Saturday and on the Sunday morning to examine the parked aircraft at leisure. We were well rewarded, for most of the machines were already assembled under a blue sky in circumstances which evoked the happiest recollections of Farnborough and, at the same time, of popular sporting events in our own aeronautical calendar.

A critical survey of design characteristics will be presented next week, but a few remarks will serve to introduce the more interesting types of aircraft before the flying demonstrations are described.

The S.O.6021 Espadon fighter (No. 01) had a new, square-tipped fin. Closely scrutinized were the flush intakes in the fuselage sides, beneath the frighteningly small, swept wing; the ports for the six guns and the ammunition ejection chutes were faired over and the massive main wheels were gold-lettered "Dunlop."

The ejection seat of Marcel Dassault's M.D.452 Mystère (likewise No. 01) was a Martin-Baker, whereas that of the Espadon was an S.N.C.A.S.O. The Mystère was guarded by a white-overalled team, each man having a "Mystère" insignia on his breast pocket. There appeared to be little or no taper on the back-swept wing of this fighter, the fuselage of which bore a notice counselling would-be rescuers to "Break glass and pull knob to liberate pilot."

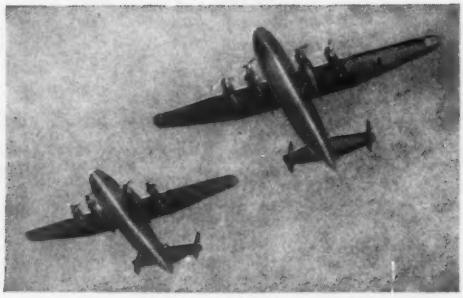
A standard Republic F-84E fighter-bomber of the U.S.A.F. had 190-gallon tip tanks and bomb/tank supports beneath the inner wings. Curiously, the Americans are far more long-winded in their ejector-seat warnings than ourselves. A notice on the Thunderjet read "This airplane contains a seat ejector catapult containing an explosive charge. See [here follows the designation of the appropriate order] for complete instructions." The British version reads "Danger, danger, danger—ejector seat."

A Fairchild C-82 Packet presented by the 60th Troop Carrier Wing (M) based in Germany, was fully equipped for evacuation of sick and wounded. The Nord 2501, powered with two Bristol Hercules, was compared with this type, though perhaps somewhat unfairly, for the C-82 is already outdated by the more powerful C-119. A Vickers Valetta (which had brought over the Canberra's ground crew) together with a U.S.A.F. C-47, represented the older, side-door, military transport formula.

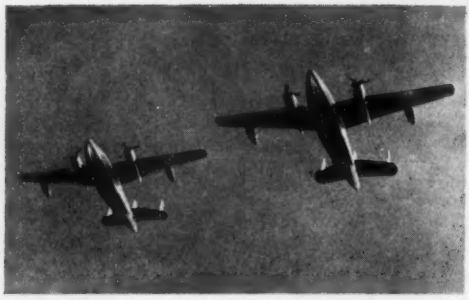
An M.S.504 (Morane-built Fieseler Storch) was shown with a special Morane retractable ski-undercarriage.

Trainers included the tandem-seat Sipa S.111 (as used by the French Air Force Flying School at Salon) and a later, metal-constructed, S.12. Both the Morane Saulnier M.S.733 and Nord 2800

(Left) France's biggest—the S.E.2010 Armagnac. Engines, four Wasp Majors; span, 159ft 1in. (Right) Britain's biggest—the Bristol Brabazon. Engines, eight Centaurus; span, 230ft. Two Armagnacs took off and demonstrated before returning to their base at Toulouse.



Twin heavyweights—the capacious Breguet Bretagne freighters.



Post-war equipment of French Naval Aviation—Nord Noroit amphibians.

THE LE BOURGET FETE . . .

were seen to be metal-built, two/three-seater trainers similar in layout, and each with an undercarriage retracting into under-wing fairings. Unlike the specimen in the Grand Salon, the Ambrosini S.7 was a two-seater.

Of the articulated-wing Rey R1 research aircraft more will be said next week. The twin turbojets of a second French research type, the S.O.30 Nene, are installed in broad nacelles with the wheels retracting outboard of the jet pipes. The Marauder flying test-bed for the Atar turbojet has very prominent lateral intakes and the Atar is installed far back in the fuselage.

Private-owner machines on parade included an Auster with a Bonmartini track-type undercarriage; Sipa S.901; Vema 51 (a most attractive six-seater of Macchi design); S.O. 7060 Deauville (first shown at the previous Salon); Paul Aubert P.A. 204, a new high-wing 140 h.p. four-seater; S.A. 104 Emouchet Escopette pulse-jet glider; M.S. 703 "colonial" six-seater of all-metal construction; examples of the Cessna 170 and 195; and a Fouga C.M.13 glider.

Transports, other than the Armagnacs, Breguet Provences and S.O. 30Ps which figured in the flying display, were two Italian-built Fiat G. 212s of the French Air Transport company and a DC-3, displayed by S.N.C.A.S.O. and fitted with a Palas auxiliary turbojet beneath the fuselage. The claim was made that for a given distance the Palas enables the DC-3 to carry 700 kg of additional load, or, for a given load, to increase its range by 700 km.

Flying-display organization for the convenience of the spectators (said to have numbered about a quarter of a million), and for the hundreds of pilots involved, was exemplary, and the occasion proved in all respects worthy of the illustrious patronage it received. The President of the Republic, M. Vincent Auriol, was there, with his Defence Minister M. Jules Moch. From Great Britain came Mr. Aidan Crawley and Air Chief Marshal Boothman, while representing the U.S.A.F. and Allied Air Forces in Europe was Lt. Gen. Lauris Norstad. Staff officers alone totalled over 100. One of the most interested technicians, we understand, was ex-Focke-Wulf designer Kurt Tank, responsible for the Argentine's Nene-powered Pulqui II fighter. From time to time one heard prominent figures in France's aircraft industry—MM. Saulnier, Breguet and Hereil among them—being called to join the President on his balcony.

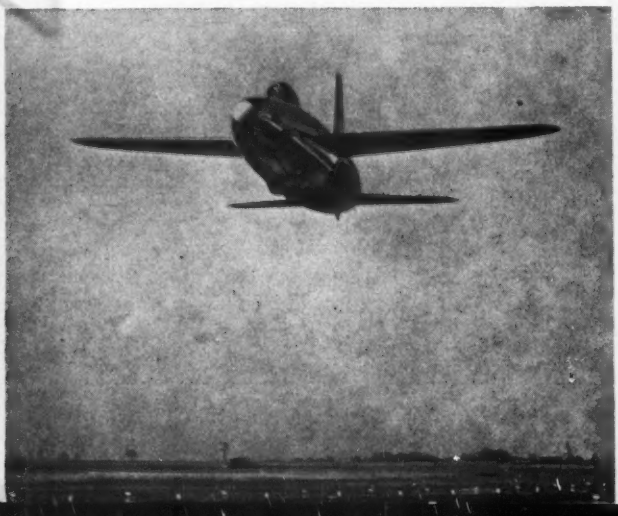
Shortly after mid-day—by way of *hors d'oeuvres* before the Lucullan banquet then being garnished—four Vampires whistled onto the scene, looping, rolling and aileron-turning with great zest. Three parachutists, with a red, white and blue canopy respectively, stepped out of a Ju 52, and a C.M.13 glider, towed aloft by a radial-engined Morane-built Storch, diverted the converging masses with a collation of bunts, slow rolls and inverted flying. The glider's performance was altogether exceptional, and bespoke equally high quality in aircraft and pilot.

Sharp at 3 p.m. the flying programme officially opened—happily on a note of novelty, for the performers were a pair of Emouchet Escopette gliders powered with S.N.E.C.M.A.-developed pulse-jets as shown in the Grand Palais and described in our issue of June 22nd. One had six jets, in two clusters of three, and the second had four only; but both made an impressive amount of noise (as was expected) and clipped along the enclosures at very low level and at speeds which ranged, one guessed, between 60 m.p.h. and 80 m.p.h. Visually this was an appealing little display, and in a sense one even appreciated it aurally—it was so nice when the noise stopped.

Next—for the first events were, as the French say, "consecrated" to light aircraft—the Paul Aubert P.A.204 took off for a surprisingly lively performance, considering its low power (140 h.p.) and capacity (four seats).

We knew what to expect when Sonderman lifted the yellow and silver Fokker S.11 trainer off the runway, and, sure enough, it came—the low flick roll from take-off (Sonderman's signature); spins in each direction, slow rolls, and masterly crazy flying. The S.11 is far removed from, say, Miss Betty Skelton's *Little Stinker*. It is, in fact, a two/three-seater military trainer; but the Dutch pilot could hardly have given a more gripping performance in an out-and-out stunt machine. There were one or two fraught moments (or so it appeared from the control tower) when Sonderman found himself in too-close company with the Morane Saulnier M.S.733 which performed prettily, if less spectacularly,

Photographic evidence notwithstanding, the S.O. 6021 has swept wings.



The Attacker rolls and leaves a wake in the best Naval manner.

in the hands of M. Petit. The tandem-seat Sipa 12 (basically a German Arado design) did an eight-point roll, among other satisfying, if not exactly dramatic, manœuvres.

Then two Fouga Cyclopes (Bourrieau and Legrand) whistled off the runway for a truly jet-fighterish performance, with slow rolls, rolls-off and similar advanced evolutions. In the estimation of many onlookers the pilots were more to be envied than any others on the programme. If ever an air of good breeding was borne out by demonstration, the Cyclope is a case in point.

There were those present who maintained that they distinctly saw the articulated wings of the Rey R1 (Boyer) flexing as this shapely twin made its demonstration circuits. We ourselves were not so fortunate. The Rey carries a tail parachute to help the pilot (as it was announced) "to maintain control in any position," and M. Boyer gave the crowd much pleasure in releasing it as he flew along the runway. Such jack-in-the-box items are always well received.

The Vema 51, which we had admired in the static park, did not disappoint in the air. On his first run the pilot, M. Lignel, flew parallel with the enclosures, changing quickly from bank to bank—which is surely as good a way as any of showing off an aircraft of this sort. As a somewhat similar, though metal-built, French twin, the Morane 703, got under way for a convincing sequence of manœuvres (largely on one engine), the Double Wasps and Wasp Majors of two Breguet Provence freighters and two S.E. Armagnacs began to roar against each other and drown the sharper note of the Wasp Juniors in the Fokker S.13. After a good take-off, this crew trainer did little to distinguish itself; but how, indeed, is the pilot of such a useful but unspectacular machine to beguile a vast public audience?

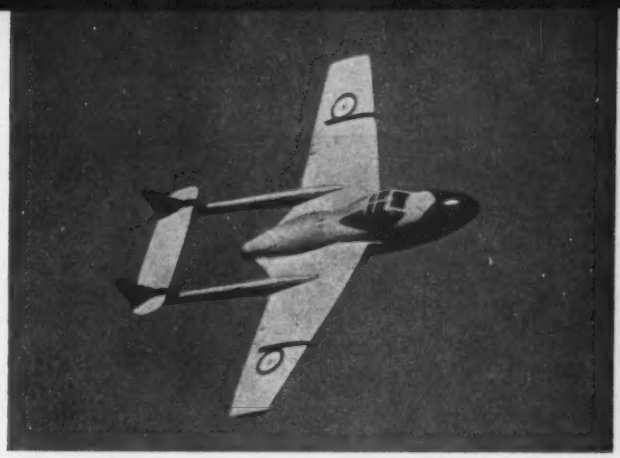
The Nord 2501 twin-boom freighter, which looks, and behaves like, a very good aircraft, got away in fine style. Its pilot, M. Detré, soon feathered one of the two Hercules 739s and turned without difficulty against the live engine. There was some talk of the 2501 being ordered for the R.A.F.

The Marauder test-bed for the Atar turbojet flew past with both piston engines stopped.

One could not help wondering if the multiplicity of certain types (there were two specimens of the Breguet Provence, four S.O.30s and two Armagnacs) was by way of reply to criticism that the French industry builds mostly "one-off" prototypes. However this may be, a trio of S.O.30Ps (Brunaud, Lonvario and Jacquet) took off in quick succession, formed up into a tight vic and crossed the airfield at low level, each with one airscrew feathered, before making a sort of stream landing. This was an unusual and quite impressive demonstration, though, of course, strictly un-civil.

The four-engined Breguet Provence freighter is an endearing machine to watch, being of elephantine stature and apparently as docile in handling as it is accommodating in the matter of loading. A pair of these two-deckers took off (one in about 32, the other in about 22, seconds) and flew by in close company. Having landed, one debouched three SIMCA 9s, closed its doors and taxied away, the trio of tiny cars following it round the perimeter track like affectionate puppies. A version of the Provence, incidentally, is being tested by the Aeronautique Navale in the same (anti-submarine) role as our own Shackleton.

Those who attended the Orly Display two years ago will not forget the very large Sud-Est Armagnac prototype, with four Wasp Majors. This year two of a production batch of 15 (one in Air France livery) flew past at low level and looked very stately, and as fast as one would expect. Their time being up, they headed south for Toulouse, their home base, to continue tests and development



John Derry passes by in the de Havilland Venom night fighter.

flying. One learned that it was unlikely that the Armagnacs will ever be seen on the North Atlantic run, for the type is hardly competitive with the Stratocruiser and Super-Constellation; it should, however, do a useful job on the French colonial routes.

As one of the Armagnacs made its final low pass, eleven Boeing B-50 bombers of the U.S.A.F. roared over in soldierly array, looking very stern and handsome. They formed a vanguard, as it were, for the three mammoth Convair B-36s which arrived from Lakenheath in vic formation and (imagine a close-knit flight of three Brabazons !) presented a spectacle to remember. They flew on to Belgium and Holland. Le Bourget tower tried to raise them on the R/T. to relay any messages they might have, but the two departing Armagnacs were busy exchanging impressions of the display and no word from the Convairs came through.

The S.O.30 Nene research aircraft got away smartly and went into a steep climbing turn. Thereafter it comported itself in a manner which suggested that the Rolls-Hispano jets have been happily wedded to this clean airframe. The pilot was Goujon, and he showed off his aircraft in very tight turns and, after low runs, in steep zooms. If these were not exactly up to Canberra standard, they certainly recalled the performance of the Tay-Viscount at Farnborough last year.

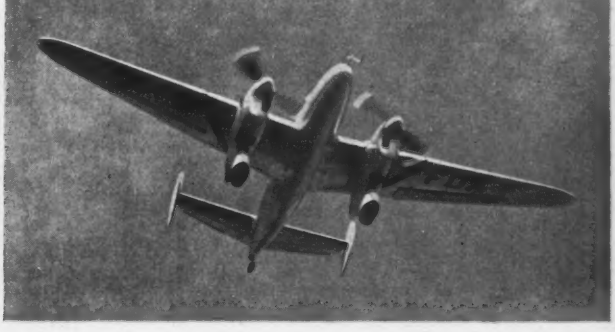
With a noise which someone aptly described as resembling that of a goods train puffing up a steep gradient, the S.O. Ariel III turbine-powered helicopter got into its stride. It seems to handle well, and comments on its performance were as enthusiastic as those evoked in the Grand Palais by its unique design-features.

Thirteen aerobatic Vampires, in two separate formations of four and nine (the first was to have numbered five, but one pilot met with a fatal accident during practice) acquitted themselves in a manner which did l'Armee de l'Air the greatest credit. Especially fine were the manœuvres of the larger formation which comprised a vic of five, with a second vic (chevron fashion) of three, and lastly a single machine "in the box." Their rolls were absolute perfection, and there was great jubiliation when the leading and wing Vampires suddenly started trailing smoke from each boom before breaking formation very dramatically, the leader rolling vertically upwards to many thousands of feet.

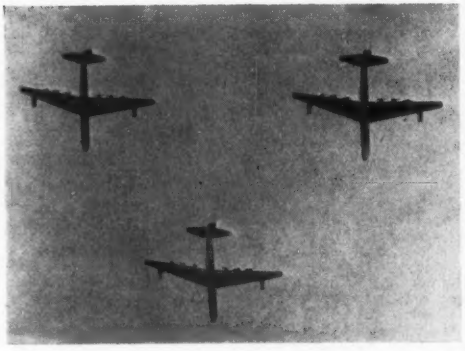
Successively presented were three single-Nene fighters—the

Unlike piston-engined versions, the S.O. 30 Nene has square wing tips.

Black sealing-strips mark lines of articulation on the wings of the Rey.



McDonnell Banshee fighters from the U.S. carrier "Coral Sea."



The awe-inspiring passage by Convair B-36 bombers of the U.S.A.F.

THE LE BOURGET FÊTE . . .

S.O.6021 Espadon, flown by Guignard, the S.E. Mistral Nene-Vampire development (Lecarme) and the Marcel Dassault Mystère (Rozanoff). The Espadon, announced as having recently achieved Mach 0.94, unstuck in about 22 seconds, and did some low runs. Possibly owing to the bulk of the machine these passes did not, however, seem as fast as those of the Supermarine 535 or Hawker P.1081 at Farnborough last year. The Espadon's powered ailerons allowed some rapid rolls, including one, of the hesitation variety, on the "cardinal points," and the landing did not appear so "hot" as might have been expected. The Mistral was away after a shorter run; Lecarme made full use of the Nene's thrust in a zoom out of sight and in a sudden open-up and climb-away from a very slow fly-past.

When Rozanoff in the Mystère was announced there was an audible smacking of lips and much impatient shuffling. This fighter unstuck in 20 seconds or so. Against the sun, whether in plan or side elevation, its silhouette is disturbingly reminiscent of the Mig 15's, and, indeed, its performance must approach that of the Russian type. The Mystère had, a few days previously, been clocked at 633 m.p.h. at a height of 330ft; even so, the Nene was not fully opened-up. Rozanoff presented this promising fighter in fast rolls and low runs—one, close by the Presidential balcony, with shattering effect.

Three types of "mechanical helicopter" (to distinguish them from the Ariel) were next airborne. There were two Hiller 360s; a Bell 471 with five up (including two very lively "stretcher cases" on the outriggers); and the much-admired Bristol 171. While its smaller brethen gambolled near the ground, the Bristol hovered becomingly overhead, though when its turn came to perform at low level, the pilot, Mr. Hosegood, left no doubt that the 171 possesses altogether exceptional qualities of manœuvre.

Now it was the turn of France's Aeronautique Navale. Eight Grumman Hellcats of this finely manned Service, together with thirteen Curtiss Helldivers, made strafing runs. Then three S.O.95 radio and radar trainers, three Bloch 175 torpedo bombers, one Breguet four-engined flying-boat, and three Nord Noroit twin-engined amphibians flew past and four of the Helldivers made a simulated carrier landing, aided by "le batsman." The Hellcats recrossed the field in a trim anchor-like formation before an exhilarating break-away.

Having seen this obsolescent naval equipment handled so well, the spectators much have looked forward with special interest to the de Havilland Venom side-by-side-seater night fighter, a version of which will equip French, as well as British, carrier-borne squadrons. John Derry had the Venom airborne after a short run, and a characteristic Derry rendition of aerobatics and inverted flying ensued. Both naval air arms have evidently chosen wisely.

Appropriately, the Venom was followed by a Vickers-Supermarine Attacker, one of two flown over from the Naval Air Fighting Development Unit by Lt. Cdr. Nation and Lt. Dick. The trip from West Raynham was completed in 36 minutes, at a height of only 5,000ft. Lt. Dick was the demonstrator, and he earned applause with his out-of-sight zooms and protracted inverted runs.

A third navy—that of the United States—was most worthily represented by a dozen McDonnell Banshee jet fighters from the carrier *Coral Sea*, stationed in the Mediterranean. This was the Banshee's first appearance in Europe, and a splendid impression the formation made, on its low-level runs, with the Westinghouse jets emitting a delightful low singing note—as individual as that of a bosun's pipe.

Flown by "Bill" Else, a Gloster (Armstrong Whitworth) Meteor N.F.11 radar-equipped two-seater night fighter got away smartly as the commentator credited it with a speed of 960 km/hr (596 m.p.h.). Certainly it looked fast, and even though its underwing tanks were in place, it put up a remarkable aerobatic performance. In poor weather the N.F.11 had made the Baginton-Le Bourget trip in 45 minutes.

Captain ("Bristol") Bartlett, who gave a commentary in English, now tried to contact the approaching Brabazon. After a series of calls to "George Peter Willie" (the Brabazon is registered G-AGPW), and a few hopeful "Hullo Bills" (for Mr. Pegg was, of course, at the controls) he eventually got through. Pegg gave his position as five miles north of the airfield, and, thus informed, we soon spotted the 135-ton giant bulking airship-like in the distant haze. The awed assembly goggled as the Brab, on its very low runs, shaded them beneath its 230ft wing.

Britain's stock was now rising fast, and went up several more points when the Canberra thundered off the runway. W/C. Beamont being "hospitalized" with appendicitis, his place at the Canberra's controls was taken by Mr. Squiers. We believe that, had he been present, "Bea" would have been as delighted with Squiers' performance as were 250,000 other people. The arrow-like climb from a quick getaway, the sudden dramatic shutting off of the Avons, the rolls and the tight turns all showed the Canberra at its best; and its glossy black and grey finish made most of the other machines look shabby.

Rolls-Royce gas turbines—this time Dart turboprops—were a key feature of the next performance—a fast low fly-past by the Vickers Viscount 700, the quiet virtues of which were duly extolled

Nose of the Nene-powered Marcel Dassault Mystère swept-wing fighter.

THE LE BOURGET FÊTE . . .

by the commentator. The pilot, we believe, was Mr. Trubshaw.

Hailed as the R.A.F.'s *patrouille de haute école*, four Gloster Meteor 8 intercepters of No. 74 Squadron now took the stage. The names of the pilots appear on page 26. Let it be said here that the Meteors' performance was—as it could hardly have failed to be, with such pilots and machines—a very beautiful piece of flying indeed; but it was a performance for the connoisseur rather than for the men on the *pavé* and, in all frankness, it was outshone by the U.S.A.F. Skyblazers, of whom more later. It is not easy to put this fact on paper, and the present is not time to argue the whys and wherefores; but as comparisons at a great international display are inevitable and Service prestige is at stake, we must admit no prejudice.

The tower got in touch with the Comet when it was 30 seconds away. Arriving, it orbitted low—the essence of grace and beauty—and gave the multitude a close-up of what the S.O. Champagne may resemble when it is completed some years hence.

And now for the Skyblazers, or as the man-at-the-mike styled them, "le Skeeblarzers," in their four tip-tanked Republic F-84E Thunderjets. Their act is now internationally known, but never before, we surmise, has it been carried through in such dashing style. Not only were the formation aerobatics of the highest order, but the low runs, with the axial Allisons smoking impressively, if not efficiently, aroused great waves of spontaneous applause. We ourselves, atop the airport building, were treated to the closest close-up of a flat-out F-84E we could wish for.

They are swashbucklers, these 'blazers, but they are artists through and through: their vertical-climb formation-break-away and final daisy-cutting crossovers in the centre of the airfield were positive proof of this.

By some mischance one Thunderjet zoomed up directly in the path of an approaching formation of 48 Vampires. It seems (we did not witness the actual incident) that the formation turned, the inner wing man stalled out and—whether under orders or through necessity—the whole group broke up. Immediately the northern sky was filled with milling Vampires. It was all most uncomfortable. The Vampires concerned were the leading element of a fly-past by French and British Vampires and U.S.A.F. Thunderjets—144 machines in all—which was to have formed the climax of the programme; and certainly it was a brave sight. But when the massed fighters had passed over, a lone Skyblazer streaked by at runway level and rolled thunderously and continuously into the far distance. The U.S.A.F. had finally signed off.

Dazed by sun and spectacle, we groped our way downstairs, heartily in agreement with Captain Bartlett's pronouncement that we had witnessed a very remarkable show. H.P.K.

DR. BALLANTYNE TAKES OVER

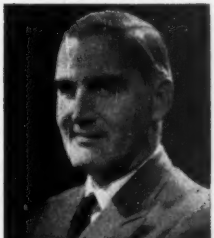
THE impending retirement of Captain J. Laurence Pritchard after 31 years service as secretary of the Royal Aeronautical Society was announced in April, 1950. His successor, Dr. A. Ballantyne, assumed the secretary's duties last Monday, July 2nd. Captain Pritchard's colleagues on the staff of the R.Ae.S., some of whom have worked with him for many years, have presented him with an inscribed gold watch as a parting gift.

Captain Pritchard has agreed to continue with the organization of the Anglo-American Conference between the Institute of the Aeronautical Sciences and the R.Ae.S. which is to take place in Brighton between September 4th and 7th. Thus his many friends may still be able to find him at the Society's headquarters in Hamilton Place for a month or two longer.

Capt. J. Laurence Pritchard (left), the retiring secretary of the Royal Aeronautical Society; and Dr. A. Ballantyne, who took over last Monday.

B.E.A.'s P.R.O. Retires

AFTER fourteen years in civil aviation, Mr. John C. Henry, head of B.E.A.'s public relations department since the Corporation was formed in 1946, retires at his own request at the end of this month in order to devote himself to his personal business interests. John Henry joined Imperial Airways in March 1937 as an operations officer and in November 1947 became technical assistant to Major R. H. Mayo, with whom he worked on the Short-Mayo composite aircraft. On January 15th, 1940, he joined the R.A.F. as a pilot officer in the Intelligence Branch and attained the rank of squadron leader only six months later. His war service included three years as an Intelligence liaison officer with the United States Forces. He was permitted to leave the R.A.F. in August 1944 in order to undertake responsible duties in B.O.A.C., and he transferred to B.E.A. on its formation in 1946. Mr. Peter Masefield, the chief executive of B.E.A. pays this tribute to John Henry: "Throughout the five years of B.E.A.'s existence he has made for himself a wide circle of friends in all branches of aviation and his colleagues will miss greatly not only his presence but also his counsel. We shall always regard him with both affection and respect and we shall always retain a warm appreciation of all he has done for B.E.A."



Mr. John Henry

Mr. W. ("Bill") Simpson, O.B.E., D.F.C., has been appointed acting public relations officer in Mr. Henry's place. For the past three years he had been B.E.A.'s Press superintendent. He began his flying career in the R.A.F. in 1935, and flew Battles in the desperate struggle before Dunkirk. He was shot down, sustaining serious injuries, and spent two years in French hospitals before being repatriated from Vichy territory. He was made an O.B.E. in recognition of his work on the National Advisory Council for the Employment of the Disabled.

Bristol in Canada

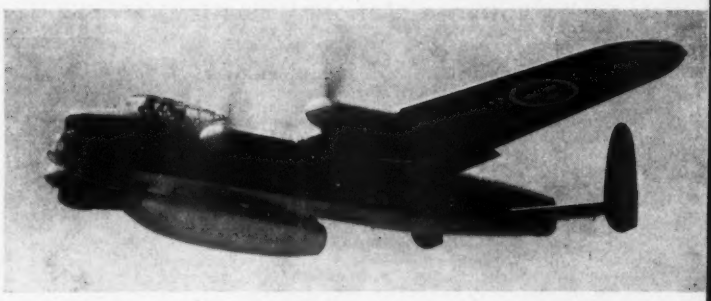
THE Bristol Aeroplane Co., Ltd., states that it has carried a stage further its policy of direct participation in the Canadian aviation industry as a supplement to normal export sales. Formed last year to promote Bristol interests in the Dominion, the Bristol Aeroplane Co. of Canada, Ltd., has acquired the aero-engine repair business at Montreal, hitherto carried on by Canadian-Wright, a subsidiary of the Mailman Corporation, Ltd., of U.S.A. The business, taken over on July 1st, will be carried on by a new company, Bristol Aeroplane Engines (Eastern), Ltd. There are thus now two Bristol engine-repair bases in Canada—British Aeroplane Engines, Ltd., of Vancouver, and the new company in Montreal. The Board of the new company is as follows: W. R. Verdon Smith, president; R. J. Reynolds, deputy president; H. V. Wright, managing director; J. Armand Limoges, vice-president and secretary-treasurer.

Mr. Verdon Smith is an executive director of the Bristol Aeroplane Co., Ltd., of England, and president of the Bristol Aeroplane Co. of Canada. Mr. Reynolds is the resident executive director of the Bristol Aeroplane Co. of Canada, Ltd., while Mr. H. V. Wright and Mr. Armand Limoges have been the principal executive officers of Canadian-Wright for many years.

Vickers, Ltd., Chairman

IN a recent reference in these pages to the Annual General Meeting of Vickers, Ltd., the name of the company's chairman should, of course, have been given as Lt. Gen. Sir Ronald Weeks, K.C.B., C.B.E., D.S.O., M.C., T.D.

HERE AND THERE



A.S.T.'S NEWEST CONVERSION : This Avro Lancaster has been converted by Air Service Training Ltd. for development flying with a new Swedish axial-flow turbojet. F/L. T. R. Fowler recently delivered it to the Swedish Air Force's experimental establishment at Malmslätt.

The Vickers Valiant

THE Vickers 660 four-Avon bomber has been named the Valiant. The prototype was inspected last Friday by the Air Minister, Mr. Arthur Henderson. There was, incidentally, a previous Vickers Valiant—a two-seat military biplane in the nineteen-twenties.

Orenda-Sabre Speed

LATEST high-speed cross-country flight by a North American Sabre jet fighter (in this instance the Canadian Orenda-powered prototype) is from Toronto to Montreal in 28 min 34 sec, at an average speed of 665 m.p.h.

Military Jetliner?

THE Avro Canada Jetliner has been offered to the United States for use as a military aircraft, and production plans will depend on acceptance of the offer. Civil production has been deferred while the company is busy with the CF-100 fighter.

B-36s Here Again

ANOTHER visit of Convair B-36s to Lakenheath, Suffolk, took place last week-end; they also flew in formation over London and to the Le Bourget Display. Three of these 358,000 lb bombers were to stay for a few days. Six B-36s visited this country last January.

Triple Flight Refuelling

FLIGHT tests of a new scheme for simultaneously refuelling three jet fighters from a single tanker aircraft are reported to have been carried out successfully in this country. The tanker reels out three hoses, one from the fuselage-belly, and one from each wing-tip, and the fighters make contact by the probe-and-drogue method.

I.Ae.S. Awards

IT was announced last week by the Institute of the Aeronautical Sciences that Lt.-Col. Marion E. Carl is to receive the 1951 Octave Chanute Award "in recognition of his outstanding contributions to evaluation of advanced-type naval aircraft and for a continuously outstanding career devoted to the advancement of the art and science of flying." He is chief of the carrier aircraft flight-test section at Patuxent. Dr. John B. Johnson, head of the metallurgy group, Office of Air Research, receives the 1951 Thurman H. Bane Award "for outstanding contributions in the field of high-temperature materials used in aircraft propulsion units."

Deauville Rally

THE fifth post-war London-Deauville Air Rally was held last week-end, when over 350 members and associate members of the Royal Aero Club landed in about 100 aircraft at St. Gatien airfield. The rally was won by Mr. Kenneth Davies, vice-chairman of the R.Ae.C., flying a Fairchild Argus. Mr. John Dykes was second in an Auster.

£9 Million Momentum

THE Kaiser-Frazer Corporation has obtained a $25 million-dollar (about £9 m) credit from a group of U.S. banks in order to finance a new war-production subsidiary under the title of the Kaiser Manufacturing Corporation. At present the Company has 1,500 employees on its aircraft production lines, where Fairchild Packets are being built. Car production has been cut from 1,400 to 200 a day.

U.S.A.F. at Prestwick

THE U.S.A.F. is shortly to take over part of Prestwick Airport as a transatlantic ferry base. Some 60 engineer officers and other personnel of the Military Air Transport Service are soon to move up from Burtonwood to begin the necessary planning of the base, which will be under the control of the Air Force H.Q. at Ruislip, Middlesex.

Kaman Contract

THE Kaman Aircraft Corporation has been awarded a U.S. Navy contract to investigate the application of a small gas turbine to a helicopter. The Kaman design was selected from several submitted, and the turbine to be used is the Boeing 502-2, for which a power figure of 200 s.h.p. plus 50 lb thrust at 2,700 r.p.m. is quoted for take-off.

Hendon Display Admission

ADMISSION prices to the *Daily Express* and R.Ae.C. "Fifty Years of Flying" exhibition and display at Hendon (July 19th-21st) have been announced as follows: Adults, 2s 9d; children, 1s 6d; forces in uniform, 1s 6d. "All in" tickets (cars and passengers), 10s in advance, 12s 6d on the day. Advance booking—with s.a.e. to Hendon Display, *Daily Express*, Fleet Street, London E.C.4—is advised.

Ex Cathedra—

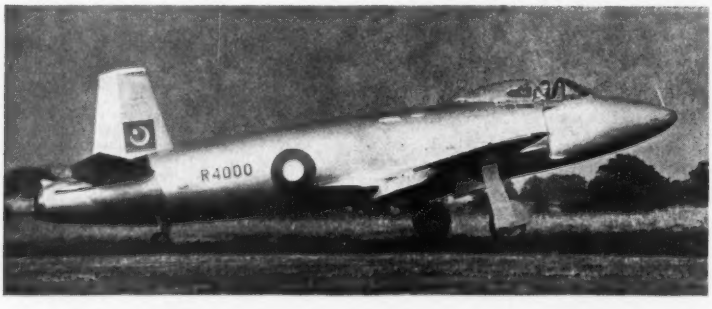
A NEW kind of helicopter rescue was made recently in New York by a Bell aircraft of the Police Department, called to lift an injured steeplejack from the roof of the Cathedral of St. John the Divine in Manhattan. The aircraft landed on a small area of the roof, between gothic spires.

—and *ad Agricola*

AT the Royal Agricultural Society's show at Cambridge this week a Hiller 360 helicopter owned by Pest Control, Ltd., was landed by Mr. J. H. Harper on the 19ft by 19ft roof of the company's stand. The machine was one of the two which recently sprayed 170,000 acres of cotton in the Sudan, while in recent food-crop spraying it has treated 590 acres in one day.

Lord Mayor's Rotor-coach

ON July 17th the Lord Mayor of Bristol (Alderman R. F. Lyne), accompanied by the City Sword-bearer, is to walk from his Clifton residence, the Mansion House, to a Bristol Type 171 Sycamore helicopter parked on the nearby Clifton College sports ground. He will then be flown by C. I. Hosegood to Avonmouth and landed



UNFAMILIAR MARKINGS on this Vickers-Supermarine Attacker are those of the Royal Pakistan Air Force, now in process of receiving a small number of these Nene-powered fighters.

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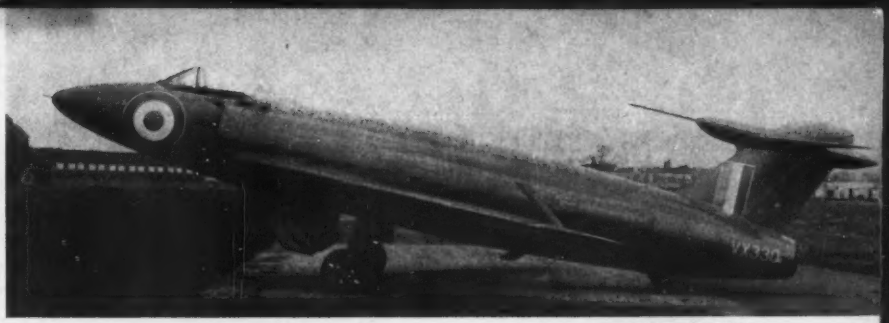


STUDYING FORM: Built to investigate a new Handley Page wing form, the H.P. 88 (first depicted in "Flight" last week) is a joint Handley Page and General Aircraft venture. The fuselage is of Supermarine origin. Dive-brakes of large area are mounted on the fuselage sides.

(Crown Copyright)

HERE AND THERE . . .

on the deck of the S.S. *Campania*, the exhibition ship visiting the port for Bristol's Festival celebrations.

Second Canberra for U.S.

THE second English Electric Canberra jet bomber to be delivered to the Glenn L. Martin Co. for flight testing will fly the Atlantic this month.

Fraises à l'Hélicoptère

STRAWBERRIES picked at 6 a.m. in Warwickshire one day last week were on the tables at an Olympia, London, luncheon a few hours later. They had been flown down by an S-51 helicopter on the regular B.E.A. Birmingham-London service.

Atom-test Types

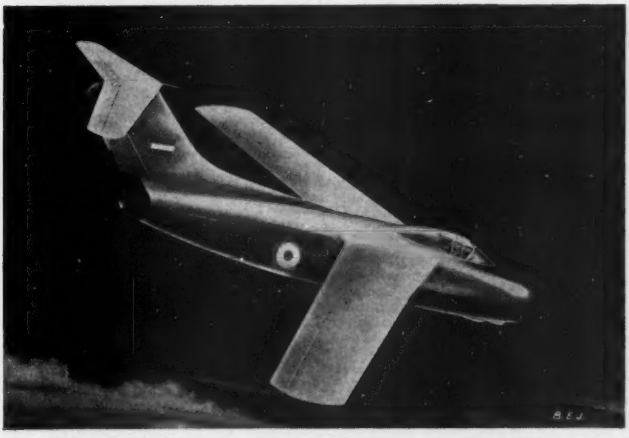
AIRCRAFT employed by Joint Task Force III in connection with the recent atomic-weapons tests at Eniwetok Atoll included 33 Boeing B-17s, 12 Boeing WB-29s (weather reconnaissance), four Boeing B-50s, two Boeing SB-17s, one Boeing XB-47, ten Lockheed P2Vs, ten Lockheed T-33s, six Lockheed F-80s, two Grumman SA-16s, one Douglas C-54, five Douglas C-47s, 16 Convair L-13s, six Stinson L-5s and four Sikorsky H-5s. Of this number, 22 were pilotless "drones."

Film Men—

ACTORS in the Battle of Britain film *Hawks in the Sun*, now being made at R.A.F. station Kenley, include Richard Leven, an ex-fighter pilot who left the Service as a wing commander with a D.S.O., D.F.C. and Bar and Belgian Croix de Guerre; Humphrey Lestoq (radio's "F/O. Kite"), who was a Spitfire pilot and a D.F.C.; John Barry and Harold Siddons, who were both R.A.F. pilots; Cyril Raymond, who was a wing commander on fighter-control duties; Ronald Adam, another ex-controller; and cheerful cockney actor Harry Fowler, re-playing his wartime rank of A.C.2.

—and Machines

THE original story for the film was written by W/C. A. J. Pelham Groom—who was at Biggin Hill at the time of the Battle—and he is also acting as technical adviser, so accuracy may be expected. Most of the flying is being done by a serving officer in the Hurricane IIc, *Last of the Few*—suitably modified, we understand, to resemble a Mk I. Other, non-airworthy Hurricanes have been loaned by the Air Ministry and Hawkers, and a few Spitfires will be seen. The original title of the film, incidentally, was *Angels One Five*—to our mind a far better one than *Hawks in the Sun*. It will be remembered that a recent American flying picture, with the title *Twelve O'clock High*, was well received by the public.



THE SECOND ARROW: Designated Pulqui (Arrow) II and built by the Instituto Aerotechnico at Cordoba, Argentina, this Nene-powered fighter was designed by Professor Kurt Tank, formerly of Focke-Wulf. A top speed of 655 m.p.h. is claimed. With his chief assistant, Carlos Maria Choel, and Brigadier Alberto Ferro Sessarego, Professor Tank was due to attend the display at Le Bourget last Sunday. He may also visit London and other European capitals.

IN BRIEF

WORK has started on extensions to the Hiller factory at Palo Alto, California, which will treble present production-space for their Navy HTE and Army H-23 helicopters.

* * *

Mr. William Martin, who assisted in the building of the original Bristol Box-kite biplane, has died at the age of 90. He was made assistant works manager at Filton in 1914 and retired in 1932.

* * *

Reorganization and expansion of the factories of H. M. Hobson, Ltd., is to be financed by the issue of new capital: an increase from £200,000 to £400,000 is to be proposed at a meeting on July 18th.

* * *

A leaflet from Photoflight Ltd., Elstree Aerodrome, Herts, gives examples of aerial photography which they undertake for public authorities, commercial organizations and private individuals.

* * *

Complementing their London showrooms (359-61, Euston Road, N.W.1, and Liverpool Road, N.1), F. J. Edwards, Ltd., have opened premises at James Street, Birmingham 3, where their sheet-metal-working machinery, presses and machine tools are demonstrated.

* * *

In the current (July 6th) issue of *Metal Industry*—the only British journal dealing exclusively with the production, fabrication and use of non-ferrous metals—is a comprehensive review of metallurgical instruments on view at the British Instrument Industries Exhibition now in progress at Olympia, London.

* * *

A scheme for training those concerned in the maintenance and installation of scientific instruments in industry has been adopted by the City and Guilds of London Institute; courses will be held in technical colleges. Details are available from the City and Guilds of London Institute, Department of Technology, 31, Brechin Place, London, S.W.7.

* * *

At a luncheon in connection with the 200th anniversary of the discovery of nickel and the 50-year jubilee of Mond Nickel, Mr. L. K. Brindley (managing director) said that the vast increase which had occurred during the past two years in America's demand for nickel had been reflected here, where a priorities system had had to be arranged; the Government had given his company excellent co-operation in this scheme. Mond were now obtaining 13 million tons of nickel ore a year—equivalent to 25 tons a minute.

CONCERNING FLYING-BOATS

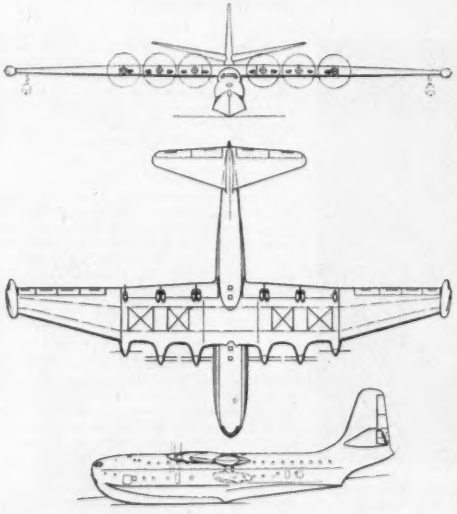
Saunders-Roe Technicians Discuss Aspects of Marine-Aircraft Design and Equipment

IN recent weeks two Saunders-Roe personalities—Mr. Henry Knowler, A.M.I.C.E., F.R.Ae.S. (chief designer), and Mr. P. R. Dowden, his technical assistant—have made valuable contributions to the literature of marine aircraft. On June 13th Mr. Knowler addressed the American Society of Mechanical Engineers on the subject of the flying-boat, with special reference to the Princess, and in a recent issue of "The New Slipway," house journal of Saunders-Roe, Ltd., Mr. Dowden surveys the variants on the lateral stabilizing theme. An abstract of a portion of Mr. Knowler's paper—the value of which is in no wise lessened by the decision to use the Princess for military purposes—is given here, and Mr. Dowden's article is paraphrased, with acknowledgements to "The New Slipway."

THE first part of Mr. Knowler's paper dealt with considerations which determined the size of the Princess flying-boat, and with power plant questions; the second portion was devoted to a discussion and description of novel engineering features incorporated. The paper was designed to show that the use of a large aircraft to achieve long range (and hence the elimination of refuelling stops) did not increase operating costs, and suggested that the large aircraft made it possible to provide improved comfort.

Mr. Knowler summarized his conclusions as follows: It was probable that refuelling stops at other than traffic centres would eventually disappear so as to reduce the journey time on main trunk routes and avoid inconvenience to passengers. It was shown that, even at this time, a journey such as that from England to New York could be scheduled for direct flight without increased operating cost, provided very large aircraft were used. Further it was considered that the future of big aircraft lay with the flying-boat, since it avoided airport runway difficulties as well as having other advantages. The big, long-range flying-boat need not suffer from preconceived disadvantages such as high drag and weight; on the other hand, it met the needs of the passenger of the future, who would demand increased comfort as well as reduced journey time. The Princess, it was considered, fitted well into the future picture, having speed, comfort and independence of airfield development, as well as the capability of low operating cost. Due to its size, it would be in a position to meet an increasing traffic potential, and obtain a fair share of the latter. The prestige associated with the big flying-boat would ensure high load factors in a highly competitive market.

Discussing structural problems, the lecturer said that the size of the Princess did not present any serious difficulties, since flying-boats had increased in size fairly continuously, the steps following roughly in geometrical progression. The new problems arose mainly from the necessity for pressurizing and from gust-loading effects on a large flexible structure. The adoption of the "cottage loaf" cross-section for the two-deck hull met two fundamental requirements—the provision of maximum floor area within a given volume, and the raising of the wing well clear of spray. The lower deck in this arrangement was the pressure bulkhead, the supporting structure serving the double purpose of meeting water and pressurized air-loads; this was found to be economical in weight and in simplifying construction.



General arrangement of the Saunders-Roe Princess, powered with ten Bristol Proteus turboprops—eight coupled in pairs and two single units outboard. Gross weight 315,000 lb.

Mr. Knowler remarked that with very large aircraft the gust loading with flexibility of structure was the deciding criterion for the strength of wings, tail and hull afterbody. To indicate the gust effect on a flexible structure he mentioned that the manœuvre factor of 3.75 was increased to 5.2, with even higher loads locally.

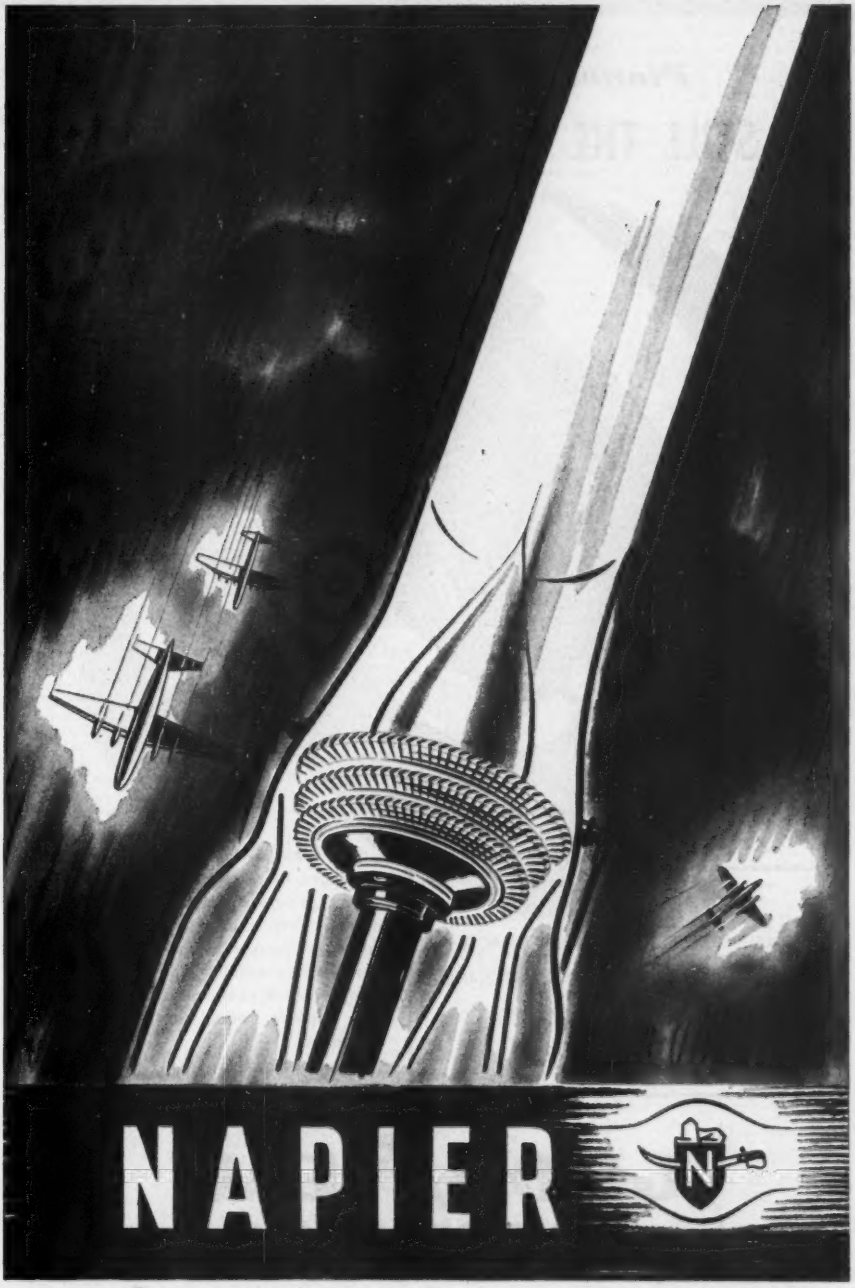
A simple box-beam structure, with two shear webs, was used for the wing as there was no necessity to depart from what was probably the most economical construction; this was also convenient for the particular arrangement of integral tanks adopted. Initially the wing floats were positioned mid-way along the outer wings and retracted completely into the wings just outboard of the outer engines. Subsequently, however, a more precise detail study showed that considerable weight expenditure was necessary to reinstate the wing strength and stiffness in the region of the recesses provided for the retracted floats, and also for the retraction mechanism. It was decided, therefore, to redesign the float system to retract to the wing-tips, since this was a much simpler procedure. Though some increase in drag had to be accepted, there was an overall saving in weight, the extra fuel weight being more than balanced by the reduction in structure weight. A further advantage was a small benefit to induced drag, arising from the improved aspect ratio effect.

The lecturer had earlier referred to the possibility of circumventing the so-called square/cube laws of weight increase with size, and now remarked that the structure-weight percentage of the Princess was 27 per cent—this being a lower figure than for any flying-boat constructed heretofore.

He went on to explain the installation of the Bristol Proteus power plants forward of the front shear web, through which the jet-pipes passed. The aircraft air intakes were positioned at the junction of the leading edge and the cowling, ducting the air to reverse-flow engine intakes. Hot gas for de-icing was bled from the turbine stages and circulated around the walls of the duct; thence it was passed through radiators which heated the auxiliary air and oil-cooler entries. Additional entries adjacent to the engine intakes supplied air for generator cooling and for leading-edge anti-icing, the supply for which passed through muffs around the jet-pipes. Power for the generators was taken from the coupled-engine airscrew drives and, since the Proteus had a free-running airscrew turbine (independent of the engine compressor) the r.p.m. could be maintained at a high rate, although the engine might be idling, thus ensuring electrical power under all conditions. The outer airscrews (on the two single Proteus) were arranged to reverse for ease of manœuvre when taxying.

In his consideration of hull design Mr. Knowler observed that flying-boats had been criticized because hull drag was greater than that of a corresponding fuselage. In recent years intensive research and model testing had resulted in greatly improved form. In large flying-boats where the size of body was dictated by payload requirements rather than buoyancy considerations, the chief cause of increased drag was the main step. A new design of step had been introduced in the Princess. Elliptical in plan form and without a break in depth, this allowed the forward lines to fair into the afterbody. An indication of the cleanness was afforded by the figure for profile drag coefficient for the aircraft as a whole—$C_{do} = .0175$, which compared favourably with landplanes of similar size. From the hydrodynamic aspect the new hull lines showed a great improvement in stability over pre-existing forms, and this had been attained without sacrifice in water resistance or spray cleanness.

Introducing his remarks on the electrical-supply system, the lecturer said that a power system of high reliability was required, since the safe flight of the aircraft depended on the electrically driven powered flying controls. This, coupled with the need for



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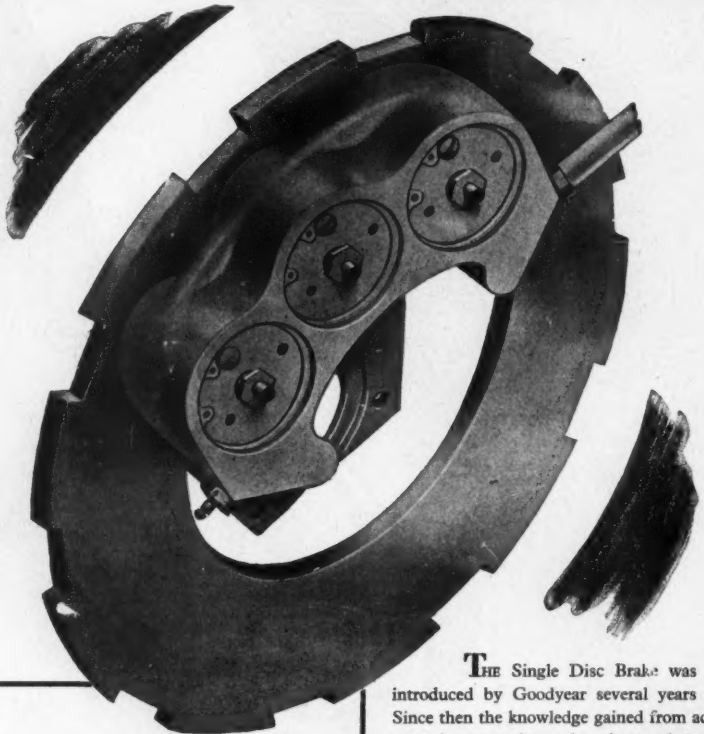

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CONCERNING FLYING-BOATS . . .

lightness and ease of maintenance, was the basic design requirement for the electrical power system. The advantages obtainable from permanently paralleled sources of supply led to the adoption of a D.C. distribution system at 120 volts, in conjunction with a 24-volt D.C. system. The use of A.C. alternators for generation, with rectification of either part or all of their output, was fully investigated, but eventually the close speed range of the Proteus free-running airscrew turbine made the use of D.C. generators possible, eliminating the complications of an A.C./D.C. supply system.

After describing the electrical system and powered flying controls at some length, Mr. Knowler turned to air-conditioning and de-icing. At the time the design was commenced, he said, no air-conditioning plant suitable for an altitude of 40,000ft, and capable of delivering the air requirements for over a hundred passengers plus the crew, was available. In order to meet Saunders-Roe's needs, and in view, also, of the Brabazon Mk II development, the Bristol Aeroplane Company's Engine Division was asked to develop equipment. This resulted in the development of two-stage centrifugal compressors delivering 60 lb of air per minute when operating at 40,000ft. The maximum cabin altitude under these conditions was 8,000ft. In parallel with this development was that of an expansion turbine refrigerator capable of dealing with the total air delivered. Two of these units were installed in the leading edge and were driven by shafting from the inner coupled engines. The installation also included humidifying units of vapourizing type, silencers, water extractors, etc. The supply would be automatically controlled for pressure, temperature and humidity. Air circulation in the cabins included re-circulation of filtered air, the latter being mixed with the warmed fresh-air supply before passing through the wall linings. The system was duplicated.

The icing conditions which the Princess had been designed to meet were minus 25 deg C. at 20,000ft, the icing being continuous, and a water concentration of $\frac{1}{2}$ gram/cubic meter being assumed. These conditions were met mainly by thermal means. A hot-air sandwich was provided over the whole length of the leading edge of the wings to 10 per cent chord, the supply being taken from muffs surrounding the jet-pipes of three power units on each side of the aircraft. The heat supplied to the leading edge was estimated to be 1,200 B.Th.U./sq ft/min as a mean, with a maximum in the stagnation area of about 4,000 B.Th.U. Hot air for tail de-icing was supplied by combustion heaters, each supplying 400,000 B.Th.U./hr. The air supply was from a forward-facing entry in the leading edge of the fin, the entry itself being de-iced by exhaust heat from the heaters. The fuel supply for these heaters was taken from the main fuel tanks.

The air intakes to the engines were heated by hot-air muffs supplied with combustion gases by a bleed from a position on each power unit between stages of the turbines. Hot gas from this source was also supplied to radiators, surrounding the entries for cooling air for the generators, jet-pipe shrouds, etc.

The airscrews were fitted with electrically heated over-shoes which were supplied via cyclic timers from the main electrical power supply. The power available for this operation was 30 kW, the current being cycled to the blades of two airscrew discs at one time. Provision was made for varying the period of the cycle.

To de-ice windscreens, it was proposed initially to use variable alcohol-jets and windscreen wipers, but, eventually, the windscreens were to be fitted with Nesa glass. Dry-air sandwiches were applied to all windows for demisting purposes and, in addition, warm air was ducted to the inside.

LATERAL STABILIZATION

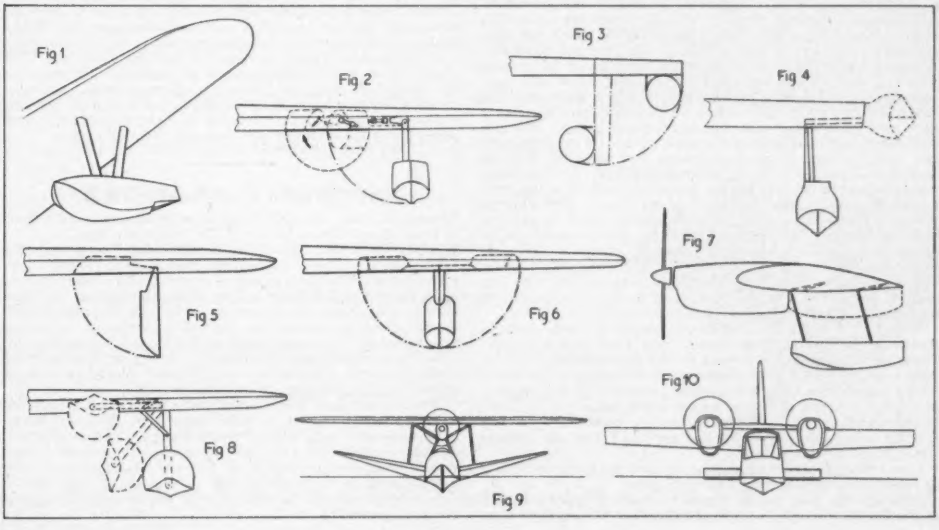
DURING excursions through the Saunders-Roe assembly shops visitors had often commented on the particular float arrangements adopted for the Princess and the S.R./A.1, and comments and questions had suggested to Mr. Dowden that a review of some developments and ideas associated with the lateral stabilization of flying-boats on the water would be of interest.

When discussing flying-boats, said Mr. Dowden, the term "float" was used to describe a particular form of auxiliary flotation which, due to weight and wind upsetting-forces, must be provided in order to obtain lateral stability on the water under static and low-speed conditions. It would be realized that hydrodynamic considerations being the reason for its presence, the size and form of the auxiliary flotation would be primarily dictated by these factors. Having satisfactorily fulfilled the hydrodynamic or water-borne conditions, the designer was left (like the landplane designer and his undercarriage) with an appendage which was not required when the aircraft was airborne.

Throughout the years of flying-boat design, the float had been the more common method of supplying the necessary auxiliary flotation; however, designers had sometimes departed from this more general formula in their efforts to achieve greater overall efficiency in their aircraft, or from necessity when other factors of greater importance had dictated.

In its early days the flying-boat had been invariably of the biplane type, with the lower wing close to the water. The auxiliary flotation equipment required for static stability had then to be placed within the restricted height between wing and water, and, consequently, the float had been attached directly to the under-surface of the wing. As the size of aircraft increased and the lower wing/water clearance had become greater, there had arrived a requirement for suspending the float some distance below the wing. Thus the float chassis had come into being.

The trend to the monoplane arrangement with its increased speed possibilities, and high wing-position dictated by airscrew



CONCERNING FLYING-BOATS . . .

and water clearance considerations, had directed attention to the chassis, which, due to its length, had become a resistance-making component which could not be disregarded. Whilst some designers preferred to retain the braced type of chassis, others (of which Saunders-Roe was believed to be the first) had investigated and introduced a cantilever arrangement. The Saunders-Roe assembly (shown in Fig. 1) was designed to absorb lateral water loads by flexibility of the twin taper-gauge struts. This type of float suspension was applied to the Lerwick and Shetland, and, in addition to the general cleanness of the installation, the flexibility built into the chassis was found to be a marked improvement from the failure aspect; on at least one occasion in severe sea conditions the Lerwick had demonstrated the relative efficiency in no uncertain manner. The ultimate in resistance-reduction for a fixed float installation had probably been reached with this cantilever arrangement, and retraction must be used if further aerodynamic efficiency was required.

Retracting float arrangements, like the landplane undercarriage, were invariably dictated by considerations of wing structure, stowage space or positional requirements. In Figs. 2, 3 and 4 various methods of float retraction were shown, Fig. 2 being a layout which had been intended for the Princess. In flight this arrangement would have presented the minimum of resistance. However, during the early stages of the Princess design re-assessment of the wing structure/float combination had indicated that in this particular application a weight penalty would have to be tolerated, and it was found that the wing geometry was being dictated by the float retraction requirements. Further investigations and wind tunnel tests had shown that, by placing the float at the wing tip, an increase in wing efficiency was obtained which almost balanced the additional resistance of the exposed float. It had also been found that an efficient wing structure design could be achieved with the revised arrangement resulting in considerable weight saving. Fig. 3 showed the tip installation which had now been adopted for the Princess and reproduced for the Duchess project. Whilst the fully retracting float layout shown in Fig. 2 had been abandoned on the Princess, its possibilities might one day be further explored.

A Saunders Patent of 1927

The tip arrangement was not a new approach to the problem, and it was interesting to record that the company was intimately concerned with the basic idea and a patent in the name of S. E. Saunders had been filed in 1927. This layout (Fig. 4) had been intended for the floats on a high-speed seaplane (designed for the Schneider Trophy contest). A float of excellent aerodynamic form was attached to the wing tip, the chassis being formed by a complete section of the wing. Apparently wing area and the hydrodynamic performance of the floats had not been considered of the greatest importance! A wing-tip float arrangement had also been adopted by Consolidated for their Catalina and Coronado series of flying-boats, and the robust form of chassis, unrestricted by aerodynamic considerations, had proved remarkably successful.

Fig. 5 illustrated a fully retracting installation which had been used by Dornier on the Do26. This arrangement had eliminated all resistance in flight, but had necessitated rather large wing "cutouts" and weight expenditure. A layout which had been suggested by Blohm and Voss was shown in Fig. 6, and it would be seen that the structural difficulties associated with this scheme were even more pronounced than with the Dornier layout. Fairchild had adopted a modification of the above scheme for an amphibian, and, using a symmetrical arrangement, had permitted half the float to project below the wing surface during flight. An installation which seemed to fall between the partial and fully retracting type was shown in Fig. 7 and was used on the Potez-C.A.M.S.160 in 1938. In this layout the vertical retraction had been so arranged that the float had formed the rear fairing of the engine nacelle during flight; thus, the auxiliary buoyancy, required only when waterborne, had been put to good use in the air. This layout had required the floats to be positioned, when on the water, in close proximity to the airscrews, and it was suspected that considerable spray interference had occurred.

A method of retraction whereby the chassis and hydrodynamic portion of the float only was "buried" was shown in Fig. 8. This "inverted" arrangement was used for the Saunders-Roe S.R./A.1 fighter, and although the thin wing precluded complete retraction in this project, the wing construction permitted the introduction of cutouts without excessive weight expenditure. A tip float installation had been investigated, but the possibility of fitting external droppable fuel tanks had suggested that the inboard arrangement should be used.

It was thought that the foregoing covered the more interesting and practicable installations of the float type.

Although the float and its varied methods of application had predominated through the years of flying-boat design, there were instances where designers had made an effort to meet the requirements in an entirely different way, and had attempted to utilize the auxiliary flotation, necessary for waterborne conditions, when the aircraft was airborne. An early attempt in this direction had been made in the English Electric Ayr flying-boat produced in 1925. The layout of this aircraft, a biplane configuration with a heavily dihedraled lower wing of fairly highly tapered plan-form, was shown in Fig. 9. The relatively thick wing roots had been watertight and so positioned with respect to the waterline that sufficient auxiliary flotation had been provided for static stability. However, the directional stability of the hull had been below accepted standards during the take-off run; considerable wallowing had occurred, and it had been found that the positioning of the wing roots relative to the waterline was a critical factor in the arrangement, particularly under dynamic conditions.

Reference to a Dornier patent specification filed in 1917 showed a layout similar to that of Fig. 9 applied to a triplane, the lower wing being used to provide the necessary flotation as on the Ayr. The idea of designing the waterborne stability installation so that it performed some useful function in flight had apparently been very much in Dornier's mind, for practically all of his flying-boats, ranging from the small Libelle to the Do X, had had aerodynamically designed auxiliary flotation. Dornier's preference for the high-wing monoplane had enabled him to utilize a small span wing, usually of constant section, to obtain lateral stability without introducing excessive aerodynamic interference effects. This truncated wing, or "sponson," as it was termed, was illustrated in Fig. 10. It had been highly effective in providing lateral stability on the water : in flight it had contributed some lift. It had provided fuel tankage, and had formed a useful platform for passenger access to the aircraft. A similar arrangement had been used by Martin and Boeing on their transport flying-boats of 1935 and 1937, and in the original application a highly tapered plan form and thickness had been used. The reduction of buoyancy at the outboard sections had been too drastic, however, and it had been necessary, on the Boeing aircraft in particular, to introduce additional buoyancy at the tips to obtain the required stability and to prevent severe wallowing at low water speeds.

It had been mentioned that the positioning of this type of stabilizer with respect to the water was critical. In 1936, Saunders-Roe had equipped a Cloud flying-boat with a series of sponson configurations in order to carry out research on this aspect, provision being made for vertical, horizontal and incidence adjustment. From these tests the arrangement for a large military flying-boat had been determined, and the aircraft had been equipped with sponsons of tapered section and with a large sweep-back angle at the leading edge. The layout had proved to be satisfactory and no trouble had been experienced with the fuel tankage, which was an integral part of the sponsons. The only other use of this layout in Britain had been on the Supermarine Air Yacht in 1929. Whilst the sponson method for lateral stability had some good features, the requirements of high speed and weight reduction had shown that the arrangement was inefficient and, except for amphibian applications, where the sponson might provide a useful wheel stowage, it had probably had its day.

The Italian Savoia Company had obtained lateral stability by an entirely different method in the Savoia-Marchetti S.55 flying-boat, and had used a twin-hulled arrangement which had provided inherent stability without the need for additional flotation. This layout obviously had a higher overall aerodynamic resistance than the single-hull type, but, from the accommodation and water handling aspects, it was an interesting layout and might yet have a place for certain duties. It would be remembered that a large formation of these aircraft had flown the Atlantic in 1933.

MAINTENANCE AND MYSTICISM

"Round the Bend," by Nevil Shute. Wm. Heinemann and Co., Ltd., 99 Great Russell Street, London, W.C.1. Price 12s. 6d.

NEVIL SHUTE'S new novel unquestionably starts well with the author at his down-to-earth, readable best. There follows a description of the development of an air-charter concern centred upon Bahrein and of many of the flights undertaken. At times there is a suggestion of the travel guide, but it is nevertheless well-worth reading, and carries the story along, particularly for anyone who shares the hero's enthusiasm for flying, and even without the aid of the additional homely narrative or the mystic religious thread which develops. Readers with no particular interest in aviation, one feels, might find some of the chapters dull.

The central figure, Tom Cutter, first introduced as an airstruck, working-class youth, is a quite likely type, but his fellow-enthusiast—an Asiatic with a "wonderful smile"—named Connie Shaklin (or Shak Lin), is a most improbable individual—a chief ground-engineer-cum-prophet, in fact—who is reluctant to take positive form in the reader's mind. Under his guidance aircraft serviceability seems to be 100 per cent. and languages, race and religions become one.

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NAUTICAL ROLE

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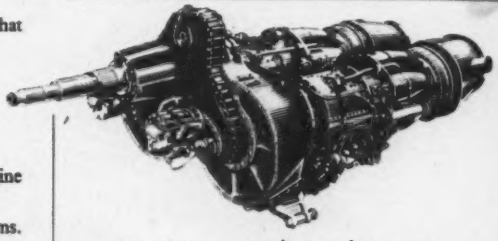

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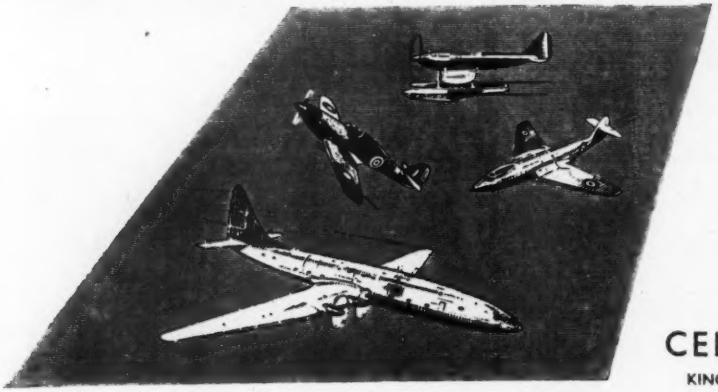

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"Flight" photographs

(Above) An H.P. Harrow torpedo bomber—a development of the prototype referred to by Mr. Osborne. (Right) The historic Handley Page Gugnunc—Guggenheim Prize contender (one of two aircraft out of twenty-seven to survive the tests), in which the author had a startling experience.

Back-seat Secretary

By S. P. OSBORNE

Recollections of a Martlesham and Farnborough Air Observer

WE are indebted to the editor of the "R.A.E. News" for permission to reproduce and adapt the accompanying text from an article appearing in the current issue of that journal. Mr. Osborne's recollections, we believe, will interest many people inside and outside the industry and Services, not least those modern counterparts of the "back-seat secretaries" of former days, among whom Mr. Osborne (one judges) was a cheerful and philosophical pioneer.

PRECISELY twenty-five years ago I covenanted with the Civil Service Commissioners "to undertake flying duties as required . . . etc., etc.," and was duly instructed to report at the Aeroplane and Armament Experimental Establishment, Martlesham Heath. This I found to be an R.A.F. station with a small nucleus of civilian scientists. There were about half a dozen of us, under Mr. R. S. Capon as C.T.O., and Messrs. Ivor Bowen and N. E. Rowe as Scientific and Technical Officers respectively. I was imported as one of two "test assistants" at the princely sum of £140 p.a., for the receipt of which, I discovered, I was expected to fly in the back seat of a variety of odd and temperamental aeroplanes and share the secretarial duties of the pilot. This was sometimes a sheer necessity, for there were certain machines that needed the utmost skill of the pilot to fly them, and it was extremely difficult for him to record his observations unaided. Hence the back-seat secretary.

It was exhilarating fun, though mighty cold and draughty, and sometimes a bit tricky when we rose to unexpected altitudes—even as high as 21,000ft—without oxygen. High-altitude trips (over 15,000ft) were unusual for the observer, but 15,000ft was common enough. It was also uncomfortably cold, and early attempts at electrically heated clothing were not an unqualified success. One pilot, I remember, tried out an electrically heated Sidcot suit and returned hurriedly in a somewhat charred and smouldering condition. One gathered that the thing had caught fire and he hadn't had a lot of room in which to flap out the flames.

Again, we used to spend hours of flying time in establishing the optimum climbing speed at various heights by a process of "partial climbs". This meant simply that over a given height range (say, 5,000ft/6,000ft) we plodded up and down measuring the rate of climb over a range of speeds. Now, at the stalling speed the aircraft wasn't expected to climb at all and, equally obviously, the rate of climb could be regarded as negligible when running flat-out level; hence by all the rules (for the aircraft obviously *does* climb sometimes) there is an optimum climbing speed. Such, one would think, is an axiom: yet I remember an occasion when we spent two hours in the morning and all the afternoon demonstrating that a particular machine climbed best at a fraction above the stalling speed and not at all at other speeds. We never did sort that one out.

The late 'twenties were the beginning (for us) of the slots-and-flaps era. There was an aircraft made by Handley Page, called the Harrow (*not* the troop carrier), designed to fulfil a long-felt want in the field of torpedo-carrying aircraft for ship-borne use. This was one of the three competitive aircraft which, like the pterodactyl of millions of years ago, was unable to fly with any elegance because it was under-powered and had too high a wing loading. The slots fit the simile in that they were a novel form of sky-hook, somewhat akin to the talons of the pterodactyl and used by that reptile to hang on like grim death to the highest eminence it could reach. These slots were good in principle, but brutes in practice. To open them a hand-wheel was provided, which jutted out of the upper-wing centre-section. Unfortunately, the pilot just could not fly the machine and wind this wheel simultaneously; so the back-seat secretary had to unbutton all his straps, etc., lean right over the pilot and do it for him. This would have been easy for a man 7ft tall, with a reach of a couple of yards; but I was built otherwise, and how I hated that horrible handle!

Talking of slots, the same firm produced a special slow-speed aeroplane, called the Gugnunc, which had all sorts of slots and flaps (automatic), and which permitted the thing to amble along at about 28 m.p.h. with the nose poked up at an incredible angle. (Storch flyers, please note!) On one occasion we were engaged in measuring the minimum speed with an air-log when the slots shut with a bang. I never before, nor have since, realized how rapidly an aircraft could pitch nose downwards. Goodness knows where the air-log went—we never saw it again.

I think that, apart from the fun of never knowing if a new type would behave or not, one of the most endearing features of practically all of them was the ability to force-land and get away with it nine times out of ten.

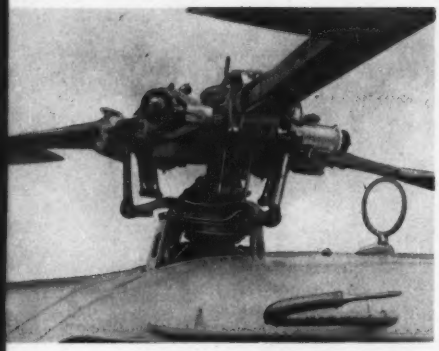
Norfolk and Suffolk are counties rich in country estates, and more than once a failing engine resulted in a forced landing in somebody's private park. On one occasion the pilot and observer were entertained to a truly marvellous picnic lunch by the owners of such an estate, who drove up in a Rolls to enquire after their safety. Since the pair of them had to remain with the machine until a relief party turned up, these charming people returned to the Hall and sent out the butler (in the Rolls) with a magnificent repast, which he set out on a white tablecloth under the trees—and then enquired as to which wine they would care to take! This sort of thing, alas, is no longer possible.

In due course, all these carefree days, full of fun and interest, gradually merged into a more mature and matter-of-fact existence. Performance testing, under the guidance of H. L. Stevens, grew more and more precise and scientific; the staff grew in number, aircraft became more complicated and, much as I regret to have to say it, I do not believe the present-day counterpart to my own early grade of Test Assistant can possibly experience the same kind of thrill as we did.

I think it was all bound up with the simplicity of those early machines. Superchargers, v.p. airscrews, jets, retractable undercarriages, autopilots, Gee, and all the rest, just hadn't arrived. It was really something if one had a roof over one's head—and even then some pilots objected because it obstructed the view! Today is so very different.

We have some good machines in 1951, but in their day some of those of 20-25 years ago were really excellent. One remembers the odd and peculiar incidents, of course, because normal behaviour does not call for special remark, but, as I look back, I am sure that the sense of adventurous excitement experienced by us just cannot happen any more—at least, not in the same way.

So I'm glad I started as a back-seat secretary.



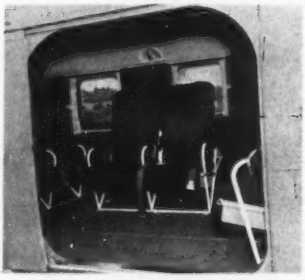
Those familiar with the earlier S-51 will note differences both in the rotor head and the blade attachment of the S-55. The controls are assisted by servo boosters.

Mr. O. L. L. Fitzwilliams, helicopter engineer.

Mr. Kenneth Reed, helicopter test pilot.

THE WESTLAND S-55

Adaptable Helicopter Acquired: Alvis Power Prospects



This S-55 has a roomy eight-seat cabin with full upholstery and soundproofing to suit civil standards. To date it is the only one so fitted.

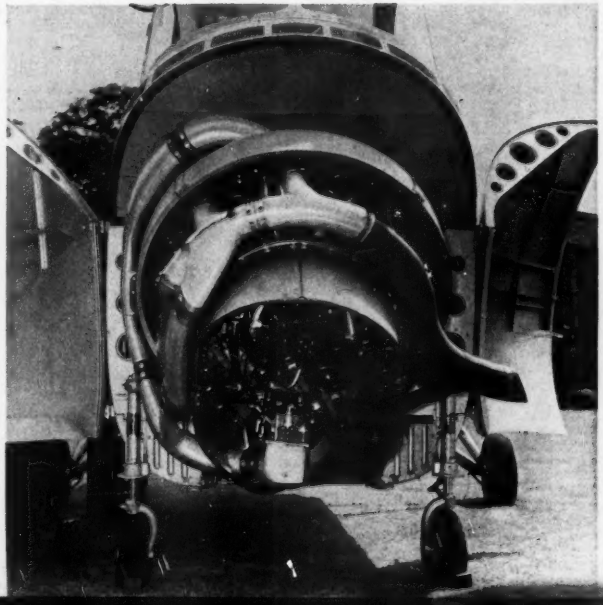
BECAUSE the helicopter requirements of the British Forces will probably have priority over all others in this class by next spring, when the first Westland-built S-55 is due to appear, the military version of this promising machine is of over-riding interest. Already the entire helicopter production capacity in the United States is devoted to military orders and last week we mentioned the exceptionally valuable on-trial rescue work which a single S-55 has been doing in Korea. Nearly 100 men have been rescued and the helicopter has operated successfully in extremely bad weather and often, we understand, with a considerable overload. Its normal ambulance load is six stretcher cases in the cabin.

A reference was made recently to the possibility of coupling two Alvis Leonides engines for a civil S-55. This proposition, after examination, has now been dropped in favour of a new single higher-powered Alvis radial in the 700-800 h.p. class, which would be likely to appeal to the Services. Serious design-work is under way on such a unit, and it is understood that many Leonides components will be employed and much of the earlier Alvis development work will now bear fruit.

Just before the war, it will be recalled, the company developed a 725 h.p. 14-cylinder two-row radial named the Maeonides Major. Its cylinder assemblies closely resembled those of the Leonides and were of the same bore, namely, 5.75 in. (146 mm). This may well serve as the basis for the new helicopter power unit which, weighing no more than the present Wasp, would impart improved performance to the S-55 and would also be available for several other installations which are now under consideration.

The large cockpit with full dual controls offers everything a pilot could ask for. The S-55 is normally flown from the starboard side.

(Right) Two lightly constructed doors open to reveal a remarkably accessible installation of a 600 h.p. Pratt and Whitney Wasp R-1340.



Illustrated with "Flight" Photographs

After flying round in formation with an S-51 for the benefit of our photographer (upper view), the S-55 was brought down confidently (below) by Mr. Reed upon the tree-decked lawn at the Commonwood House Country Club at Chipperfield. In America, incidentally, the S-55 has been successfully operated from water with the aid of two long tubular floats attached fore and aft, in addition to wheels. The Royal Navy are considering it for anti-submarine and other duties.

Air Chief Marshal Sir Hugh P. Lloyd examines the model with which R. Copland (seen holding it) won the Queen's Cup. On the right are Dr. A. P. Thurston and Lady Spriggs. (Below) J. M. Clark launching the 11ft-span glider with which he won the "Flight" Cup.

Great day for aircraft modellers

The Queen's Cup Contest at Langley Airfield

FOR the Queen's Cup Contest (flown, as we briefly reported last week, on Sunday, June 24th), the weather was as kind as it had been unkind for the King's Cup on the previous day. Her Majesty's prize, let it be said, is one that is competed for annually at the gala day held by the Northern Heights Model Flying Club, open to all clubs and aeromodellers.

Marking the 21st year of the organizing club's existence, this was the fourteenth gala day, and again the directors of Hawker Aircraft, Ltd., had put their Langley Airfield, near London Airport, at the disposal of the organizers—an ideal site, allowing plenty of room for many contests for all types of models to be flown simultaneously.

It is not our purpose to describe the proceedings in detail here: to do so adequately, with literally hundreds of engine-driven aircraft, rubber-propelled models, gliders, helicopters and even jet-powered models taking part, would require a whole issue of *Flight*.

Rather would we place on record our appreciation of the immense enthusiasm which these young engineers display ("young" in this context may be taken to include ages of up to about 70); of the very real understanding of aerodynamic principles which, allied to superb detail workmanship, produces results that astound anyone unaware of the present status of model flying; and of the thoroughly sporting spirit, observable everywhere on the day, which can survive with a smile seeing the product of many weeks' patient work wrecked in a moment: not so often by a crash (these models are designed to shed wings, tailplanes, etc., harmlessly in a heavy landing) as by some unexpected incident like somebody else's machine landing at high speed on a parked model.

Most aircraft-design, whether of the real thing or of a two-foot-span model, involves compromise; and the modelmaker's chief problem is to strike a happy medium between appearance and performance. Generally speaking, and dependent on the fact that there is inevitably a wide difference between engine-on and gliding conditions when there can be no pilot to attend to tail-trimmer and elevators, a model with a high rate of climb and good all-round flying characteristics tends to look something of a freak, often with a very high parasol wing to give pendulum stability, or with polyhedral wing-tips. Yet, as our photographs show, there are some wonderfully faithful flying scale models, and they also perform well in the air.

Radio control, too, which (largely owing to the introduction of a new type of sub-miniature valve) is becoming increasingly popular, is helping to overcome these problems. Several radio-controlled models were being flown at Langley, each one powered by the usual small compression-ignition engine and monitored by a little transmitter of attache-case size with a whip aerial about nine feet in height.

In the aircraft, which carries a short trailing aerial, is a receiver—usually weighing well under a pound, complete with batteries—that, by means of relays that respond to the pulse carrier wave sent out by the receiver, operates the rudder for yaw control and (in some cases) engine speed for pitch control. With this equipment an owner can keep his model climbing, diving and circling wherever he wishes as long as its fuel supply lasts, and bring it into a perfect into-the-wind landing.

Though acknowledging their immense popularity, and recognizing the reasons for it, we feel less enamoured of the control-line models, which somehow seem to be the negation of the grace and freedom of true flight. Skilfully controlled by a double line terminating in a hand-grip, they scream round like infuriated wasps at many times the scale speed of a true aircraft, and make their high-speed circuits unbanked, which also looks unnatural; nevertheless, we thoroughly enjoyed the spectacle of three 60 m.p.h. control-line models competing in a team race—complete with high-speed refuelling stops—and being flown *in the same circle*, their owners, at its centre, performing a complicated sort of Morris dance to avoid getting the control lines tangled.

Launched by a method quite closely allied to full-scale winch launching, the gliders (many having spans of up to 10ft) are fascinating to watch and, in flight characteristics, uncannily like the real thing. Even more responsive to thermals, they are apt to

Illustrated with "Flight" Photographs

(Below, left) Busy scene at the entry-point for the "Flight" Cup glider competition. (Below, right) An impressive radio-controlled model—E. J. Pritchard's sponson-stabilized seaplane, with transmitter in foreground; of 7ft span, it is powered by a 5 c.c. diesel engine. (Above) Beautifully finished, and a perfect replica of the original, is T. Nachtman's D.H. Beaver. It has a 1.8 c.c. diesel engine, and a span of 54in.

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(Left) A. J. P. Briggs's fine control-line model of a B-17F as used by No. 230 Squadron in the war; span is 78.5in and weight 10 lb, while four 3.5 c.c. engines give a total of about 1 h.p. (Right) Superb finish is a feature of C. J. Haggard's "free-lance" biplane (64in span, 2.49 c.c. engine). (Below) W. L. Manuel's flying-wing glider; of Göttingen 535 section, the 10ft-span wing has adjustable elevons.

GREAT DAY FOR AIRCRAFT MODELLERS . . .

set off on cross-country flights and be seen no more, so most of them are equipped with a time-delay device (it may vary from a slow-burning fuse to a pneumatic or clockwork camera-timer) which releases a spring that raises the elevators, so bringing the model into a near-stalled attitude for a quick descent; alternatively the timer may release a drag-producing parachute. Many of the power models have similar safeguards. A model that has climbed to several hundred feet may be carried many miles downwind, and at Langley on this occasion the breeze—blowing from an unexpected quarter—gave the organizers some arduous preliminary work in re-siting the various flying points on the airfield.

Dr. Peter Thurston, the veteran enthusiast (he was an assistant to Sir Hiram Maxim) who is the moving spirit in the Northern Heights Club was, as usual, looking with a benevolent eye on the wholesale enthusiasm around him; and Mrs. Thurston was clearly sharing his enjoyment: Hawker executives were there in force, including Sir Frank Spriggs and Mr. Neville Spriggs, together with test pilot Neville Duke; and Air Chief Marshal Sir Hugh P. Lloyd, A.O.C.-in-C. Bomber Command, was in attendance as president of the R.A.F. Model Flying Association—and his interest was, clearly, far keener and more knowledgeable than might conventionally be demanded of the holder of such an office.

A number of guests attended an informal luncheon-party given by the Hawker directors.

The Queen's Cup—which is awarded for the best duration performance (sum of three flights) by rubber-driven models conforming to specified limits—was won by Bob Copland, who is chairman of the Northern Heights Club and, incidentally, holds a post in the Hawker design-office. His 47in-span, 12.25 oz shoulder-wing monoplane has a most ingenious variable-pitch device incorporated in its airscrew spinner, which automatically gives fine pitch for take-off, coarse for full-speed flight, then fines-off again as the power begins to reduce, eventually feathering itself for the glide. His three flights were of 127 sec, 181.5 sec and 300 sec respectively, the duration of the first two being deliberately limited in order to ensure that the model could be retrieved. A generous cash prize from Hawker Aircraft went with the award.

The *Flight* Cup (gliders) went to J. M. Clark of the Surbiton and District M.F.C., with two flights of 4 min 52 sec and 9 min 19 sec respectively from an 11ft-span glider weighing 3.5 lb. Among other prizes were the Fairey Cup (open duration contest for any type of rubber-driven model), won by Mr. Gorham (Ipswich) who also gained a prize for the best all-round performance of the day; the Thurston Helicopter Trophy, awarded to Mr. Dowsett (Pharos Club); and the de Havilland Trophy (power-driven aircraft), won by Mr. Trow (Dudley).

During the course of the meeting a loyal message was sent to the Queen, to which her private secretary presently replied: "Will you please convey to all who are assembled at Langley Airfield, and especially those competing for the Queen's Cup, Her Majesty's warm thanks for their loyal greetings."

DESERT RESCUE EXERCISE

IN a recent desert-rescue exercise undertaken by the R.A.F. in the Suez Canal zone, twelve officers, mostly young aircrew, were taken by Army vehicles over 100 miles into the Sinai Desert, and left there as "crashed crews" with only emergency rations and a few comforts, to await rescue by the Desert Rescue Team from Fayid. Left alone, the "survivors" pitched camp, improvising tents from parachute fabric and other material. At night the weather was bitterly cold and they slept in holes dug in the sand, with only one blanket each to cover them.

The rescue machinery went into action immediately a signal was received that an "aircraft" was down in the desert. A Valetta took off to search,n and withi an hour had located the party. The look-outs, having seen the Valetta's Very signal lights 30 miles away, signalled back with their own lights.

Given the party's approximate position, the Desert Rescue Team set off late in the evening from Fayid in a seven-ton Matador truck carrying H.F. and V.H.F. radio equipment and a Eureka beacon by which search aircraft could home on the rescue team. The Matador was accompanied by a jeep, a useful vehicle for reconnoitring in the desert. Travel was rough, and the outward journey, including a night stop for food and three hours' sleep, took nearly 17 hours.

Meanwhile the Valettas had dropped extra blankets and water to the stranded party, who, with the arrival of the rescuers, had their first square meal for two days. For the first day they had lived on half rations (four pints of water and one meal) and on the second day, up to the time of rescue in the evening, they had had only survivors' basic rations (two pints of water and one emergency ration pack). The tiny emergency heliograph mirror carried for signalling purposes proved invaluable, the signals made by it to the rescuers were clearly seen from nearly 20 miles away. S/L. B. A. Primavesi, of No. 205 Group Training Branch, was in command of the "survivors."

RUSSIA'S AIR EQUIPMENT

A HANDY compendium of information on, and pictures of, Russian military machines is *Russia's Jets and Other Aircraft*, published (price 3s.) by Smith and Hallam Ltd., 145, Seal Hollow Road, Sevenoaks, Kent. A considerable amount of the descriptive material is necessarily conjectural and certain designations are suspect; the compilers have wisely indicated doubtful data.

THIS is the first of a series of biographies, by H. J. COOPER, describing the air-racing careers of the present six members of the "Throttle Benders' Union"—the unofficial brotherhood of regular participants in British air races. The six pilots are S/L. J. Rush (subject of the present article), R. R. Paine, A. L. Cole, J. N. Somers, C. G. Alington and F. Dunkerley.

Having regained the Norton-Griffiths Trophy for Britain—at Newcastle last year—Rush receives it from Lady Robb, wife of Air chief Marshal Sir James M. Robb. In the background is Col. R. L. Preston.

THE THROTTLE BENDERS

ONE of the six members of the Throttle-Benders' Union is Squadron Leader James Rush, A.F.C., who although still a very active racing pilot was in fact racing well before the recent war.

Jimmie Rush was born at Newcastle-upon-Tyne 42 years ago, and at the age of 20, joined the Newcastle-upon-Tyne Aero Club, which was then, in 1929, operating from the old Cramlington Aerodrome. He began his flying instruction on a Cirrus II Moth under George Kemp, now C.F.I. at the Cardiff Aeroplane Club, and soon took his "A" Licence. His Royal Aero Club Aviator's Certificate is numbered 9,298 and is dated July 19th, 1930.

After getting his "A" Jimmie decided to make flying his career, so he trained for his "B" Licence and gained it in 1932. For some time he flew with various charter firms, carrying mails under contract between Croydon and Brussels, and also did a lot of joy-riding work from the old airfield at Maylands, right on the main London to East Coast road at Romford.

His first race was one organized in 1935 by the Newcastle Club, when he flew one of their Cirrus Moths. Ever since Newcastle had been a turning-point in the 1923 King's Cup Air Race he had been determined to race an aircraft himself. His schoolday heroes were Barnard, Courtney and Cobham, all King's Cup winners, but in those days it never occurred to him that he would eventually find himself as one of this country's leading racing pilots.

With the Manx Air Derby Trophy, won in the Hawker Tomtit in 1938.

He raced again in 1936, when he took a Desoutter to Frankfurt to compete in the Olympic Races. He achieved little success, but today is thankful for the early experience he gained. Like those of many other pilots his first racing attempts were abortive, and it was a question of determination on his part before he could claim a place.

Another of Rush's ambitions was to become a flying instructor, and this he fulfilled in 1937, when he joined the London Air Park Flying Club at Hanworth, one of the élite Clubs for wealthy patrons. Here he came in contact with many sporting pilots—people who could afford to fly with a club that did not suffer the financial troubles which all experience now. At that time the clubs were subsidised by a Government which recognised the value of Club-trained pilots, and Jimmie describes this period as the heyday of the clubs and of flying instructors. His fellow-instructors at Hanworth were David Llewellyn, Owen Cathcart-Jones, Ken Waller and Captain Duncanson. The instructor's life was a delightful one; at least, Jimmie found it so, and he regards this time as the best in his whole life. It was at Hanworth that he met Nat Somers, who came to him as a pupil member. They became firm friends, and Jimmie believes that it was his own keenness for racing which inspired Nat to take it up.

That year Jimmie was elected chairman of the club, and he was largely responsible for its reorganisation, especially on the social side. The Hanworth garden parties and Fifth of November displays on the lawn in front of the hotel were something to be remembered.

He next raced in 1937, when he entered for the London to Isle of Man Race, flown from Hanworth to Ronaldsway. He was then also test pilot to the Aeronca Company, which was shipping components for the Aeronca-J.A.P. from America and assembling them at Hanworth; it was the first of these little 36 h.p. monoplanes that he flew in the race.

From Hanworth he led all the way to St. Bee's Head, in Cumberland, before turning W.S.W. for the Isle of Man. Over the Irish Sea he saw H.M. Destroyer *Salamander* and some lifeboats below him, which appeared to be giving him some vague sort of signals (at least, they were vague to Jimmie!). He was a little worried about his navigation, for the weather was far from friendly and the Aeronca carried no blind-flying panel, but merely a bubble. Suddenly he flew into very thick fog, right down on the water—and understood what the ships had been trying to tell him. The Isle of Man was completely enveloped and, as he had only a very small petrol margin, he began to worry some more. In a few minutes the black mass of the 300-feet cliffs at Maughold flashed beneath, and he saw the lighthouse which was one of the turning-points in the race. He had to bank sharply to avoid flying into Snaefell Mountain. Now Jimmie was more concerned about getting down safely than about winning. Through the low cloud and fog he saw a patch of green, sideslipped down towards it, between some trees, and came safely to rest in a field of young corn.

For half an hour he sat in the Aeronca's cabin, waiting for the fog to lift. It was still very thick and he began to realize how lucky he had been. Soon the puzzled face of a farmer peered into the cabin; he had been looking for the crash as he could not see how any pilot could have got down without damage. He took Jimmie half a mile to a café for some tea.

It proved to be an expensive cup, for it cost Rush the race.

All the competitors had been scattered by the weather, and only six of them managed to reach the Isle of Man. One of them, Major Hans Seidemann of the German Aero Club, flying a Messerschmitt Taifun, was told on arrival at Ronaldsway that he had not been observed at Maughold or Douglas. He thereupon took off without questioning the decision of the R.Ae.C. observers, flew

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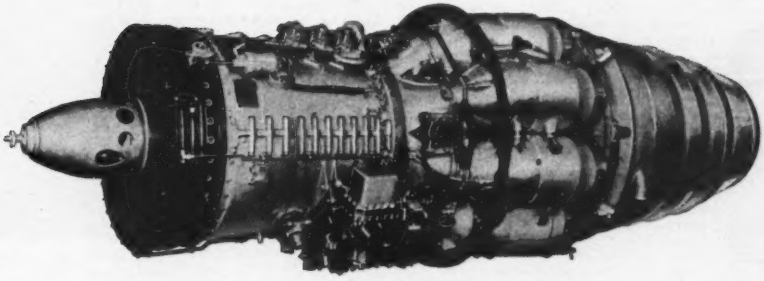

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THE THROTTLE BENDERS . . .

back northwards to St. Bee's Head, and then back again to Ronaldsway. The fog had cleared and, making no mistakes this time, he arrived back at the finishing line and was adjudged the winner, as the only competitor to complete the course properly. Meanwhile Jimmie was sitting quietly in the Green Rabbit with a cup of tea—only two miles away! The fog had lifted and he could easily have flown to the finishing line first.

That week-end he also competed in the Tynwald Air Race round the Isle of Man, and flew the Aeronca into third place at 75.25 m.p.h.

The loss of the 1937 Isle of Man Race rather rankled with Jimmie, and next year he was determined to make another attempt. He had acquired a Hawker Tomtit, G-AFFL, which he entered, but again had no luck.

But he had also entered for the Manx Air Derby, which consisted of three circuits of a course marked round the island, starting and finishing at Ronaldsway. There were 14 competitors, including a formidable German entry of an Ago Kurier, three Messerschmitt Taifuns and a Focke-Wulf Stieglitz; while Geoffrey de Haviland was flying the T.K.2, Giles Guthrie a Mew Gull and Bill Humble a Sparrowhawk.

The Stieglitz, flown by Ernst Gerbrecht, led all the way round the course—until the last minute. Then the Tomtit overtook it and was first across the finishing line in a close and exciting finish.

Rush in uniform, shortly after joining in 1939. He was posted immediately to the C.F.S.

That was Jimmie's first win, and he says that, remembering his experience in the previous year's race, it was a matter of the greatest satisfaction to him to see the swastika-marked Stieglitz fade behind him.

Rush regards the 1937-39 racing season as the best so far as he is concerned. Then, in addition to those already mentioned, he was up against pilots such as Tommy Rose and Alex Henshaw. It was a good period then, just before so many years were to be taken up with more important flying activities. Comradeship and enthusiasm were keenly felt. Today, general circumstances, political considerations and economic measures do not allow the same scope to air racing that was possible then; nevertheless, that small and select coterie known as the Throttle Benders' Union is in fact promoting this same sort of mutual help and friendliness among racing pilots, and its efforts to date are encouraging in the extreme.

But to return to James Rush, in 1939, he acquired the Miles Sparrowhawk G-ADNL for his own use. This is in fact the aircraft which Geoffrey Alington raced last year and which Fred Dunkerley has now acquired for some rather revolutionary speed-making experiments. In that year Jimmie again flew in the Isle of Man Race and the Manx Air Derby, finishing sixth in each. But he got more speed (168 m.p.h.) out of the Sparrowhawk than it had achieved before.

Next he entered it for the King's Cup planned for 1939, which it will be remembered, was abandoned because war was imminent.

Optimistically he flew it to Elmdon, where he was told by Bill Courtenay that the race would not take place and that all civil flying had been stopped. Jimmie received permission to fly the Sparrowhawk to Hanworth, where the deadness of the place only too well indicated the seriousness of the situation.

The Aeronca in the field in which Rush had to put down, fog-bound, at the finish of the London to Isle of Man race in 1937.

So ended the 20 years of air racing which had taken place between the two wars.

On September 18th, 1939, Jimmie Rush was commissioned in the Royal Air Force as a pilot officer. He was very proud to find himself posted immediately to the Central Flying School, then at Upavon. His six years in the R.A.F. cannot, of necessity, be dealt with fully here, where the emphasis is on his air-racing activities. But here it is briefly.

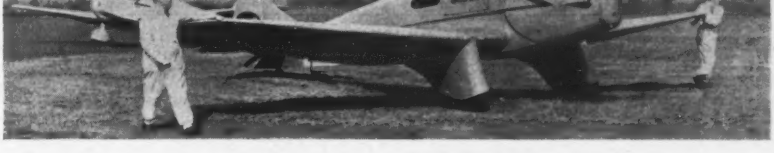
After instructing for a while at No. 10 E. and R.F.T.S. at Yatesbury on Ansons (including some operations over the Western Approaches with an occasional "brush with the natives") he was posted to South Africa as a flight commander of No. 47 Air School, Queenstown. He subsequently commanded No. 2 Training Squadron there, and also became O.C. Flying. From Durban he was engaged on coastal reconnaissance and air-sea rescue work, flying Ansons and Venturas. Incidentally, while in Africa he captained the classic Queenstown Soccer XI, and took them on a tour of the Transvaal and Cape Province in 1942-43.

He was later posted for a short time to Mersa Matruh, and in December, 1944, was sent back to England with the rank of flight lieutenant, to be offered the command of an operational squadron. Although this meant another overseas tour immediately he at once accepted, and, as a squadron leader, was appointed C.O. of No. 669 Squadron, flying Dakota tugs and Horsa and Hadrian gliders. He took this squadron (which was one of the largest in the R.A.F., with no fewer than 160 pilots on its strength) to the Far East, where he also became Deputy C.O. of No. 343 Wing. The whole squadron was, in a sense, keenly disappointed when, in August, 1945, news of the Japanese surrender was announced. Shortly afterwards Rush was given a key Air Staff appointment at No. 1 (Indian) Group under A.Cdre. (now A.V-M.) F. W. Long, C.B., and he stayed on in this appointment for a whole year beyond his normal release date, arranging for the transfer of authority to Indian officers. During this time he was engaged on staff work, on evacuation of civilians during the Punjab massacres, and on duties as a V.I.P. pilot.

Eventually, in 1946, he returned to England. In the New Year Honours List of 1947 he was awarded the Air Force Cross for distinguished flying services in India and Burma.

During all this time Jimmy had not forgotten his air-racing days, and he was continually looking forward to the time when he could race the Sparrowhawk again. This he was able to do at the Lympne Meeting of 1947, when he entered for the Folkestone Aero Trophy Race. There was little time in which to tune the Sparrowhawk and put it into proper racing trim, but he managed to get 161 m.p.h. out of it. He finished fourth in his heat and so got into the final, but he could not attain a higher place than eleventh.

Not to be discouraged, he immediately started looking around for another mount. By 1949 he was able to fly in the first National Air Races, which the R.Ae.C. organized at Elmdon Airport, Birmingham, over the August Bank Holiday. He had just acquired the Falcon Six, G-AECC, which he still flies; it was



His present mount—the Miles Falcon Six G-AECC. He believes that attention to the engine (in this case a Gipsy Six I) before the airframe pays the best dividends in racing.

THE THROTTLE BENDERS . . .

built at Reading in 1936, and had been flying on charter work. Jimmie, remembering that Tommy Rose had won the King's Cup Race in 1935 in a Falcon Six at 176 m.p.h., thought it would be well worth buying. He had in fact tried to get the Hawk Speed Six G-ADGP, but was beaten to it by Kon Paine.

The 1949 King's Cup was flown over four laps of a 20-mile course, and the 36 competitors were divided into three heats so that there would be no chance of their meeting at the turning-points. The Falcon had not been raced before, at least not by Jimmie, but he attained fourth place in his heat. In the final he finished in eleventh place.

Also at that meeting he competed for the Norton-Griffiths Challenge Trophy which, although originally offered in 1913, had not in fact been contested. It was discovered at the Royal Aero Club and put up for competition along with the other classic awards.

He very nearly won this prize, but was beaten by Jan Andrle, who had brought an Aero Ae 45 over from Czechoslovakia to compete. Second place was certainly worthwhile, but Jimmie is particularly fond of the design of the Trophy and was very keen to win it. He was determined to bring it back to this country.

And he did. By carefully cleaning up the airframe of the Falcon and tuning the Gipsy Six engine he appreciably pushed up the speed (to 165.5 m.p.h.) and came in first in the Norton-Griffiths Race when it was held for the second time, in 1950, the scene being his native Newcastle.

Right from his first racing days Jimmie Rush has believed in personal, minute and continued attention to his aircraft, but he believes that the highest performance is to be gained by looking after the engine even more than the airframe. His Gipsy Six was in splendid tune because, as he puts it, "it's under the bonnet that counts!" He admits that another factor which helped was the fact that the race was flown over his home ground, and he was able to put in some useful practice over the course. In a race of this sort valuable seconds can be sacrificed by navigation which is not literally spot-on. (Incidentally, there is no truth in the story that before any race Jimmie has to fly round the course beforehand with a pot of whitewash, marking the tops of the trees so that he doesn't lose his way—I believe Fred Dunkerley started that one!).

Jimmie regards the winning of the Norton-Griffiths Trophy in 1950 as the highlight of his racing career, and he was specially gratified by the nice gesture of Jan Andrle, who sent him a congratulatory telegram.

Jimmie had also flown in the King's Cup last year (at Wolverhampton), finishing eleventh (again!), his average speed being 163.5 m.p.h. Last year he also flew in the *Daily Express* Race, finishing fourth out of 67 starters. He thinks he would have made third place but for the fact that when approaching the finishing line at Herne Bay Pier he had to switch over to his reserve tank—and caused a temporary air-lock. Even a Gipsy won't run without fuel, and some very valuable seconds were lost until the engine picked up again. Even so, he achieved the highest speed in his weight class (179.86 m.p.h.) which is also the best speed the Falcon has ever made. He was pleased with his handicap (in which respect he must surely be unique), for he felt that the handicappers had been very fair and that he had just got a chance of getting home as soon as anyone. Which is as it should be. After all, he was only 17 seconds behind Norman Charlton's winning Proctor.

All this goes to show how an experienced pilot can improve the speed of his aircraft by attention to detail. It also brings us up to the present racing season. Rush flew in the Goodyear Trophy Race at Wolverhampton, but this time the handicappers were slightly hard on him, and made his start, for the first time, from scratch. He finished ninth, making his fastest lap at 174 m.p.h. In the recent Swansea Race he finished fifth. A fortnight ago he was all set to defend his title as holder of the Norton-Griffiths Trophy and try for the King's Cup at the same time but, as everybody knows, these events were clouded over. The next races in which he and his aircraft are likely to appear are the Bristol Race and the *Daily Express* contest.

* * *

It will probably be assumed from the foregoing that S/L. James Rush is a full-time racing pilot during the season. That is not so for he is managing director of James Rush and Co. (Northern), Ltd., well-known manufacturers of high-quality glassware, of Newcastle-upon-Tyne. He is a very active man, friendly and cheerful, and on his business flights at home and abroad he finds the Falcon Six an ideal means of transport. This year, by the way, it appears in a new colour scheme of black and gold.

Finally: Jimmie has flown 7,100 hours; has piloted 66 different types, including fighters, and—he has never had an accident.

D.H. HOLLOW STEEL AIRSCREWS

FOR some time past, de Havilland Propellers, Ltd., have been engaged with the development of hollow steel airscrew blades, and the construction and manufacturing methods employed for these are the subject of a detailed study in the July issue of our associated journal, *Aircraft Production*.

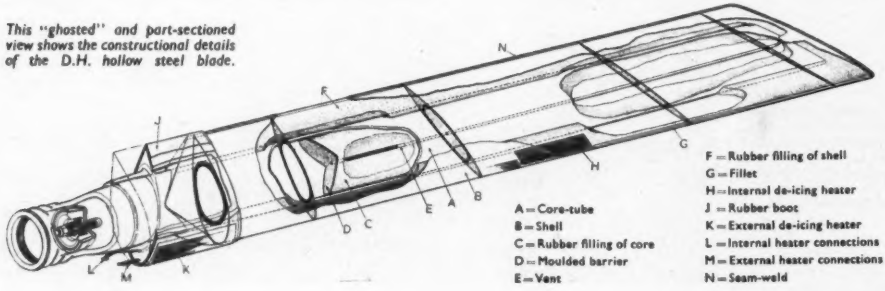
In common with Hamilton Standard (with whom de Havillands have maintained a close association for nearly 20 years), a composite form of blade structure embodying a central spar has been adopted by de Havillands as combining the greatest number of advantages. In this type of blade, the central tubular core is the principal load-carrying member, and the blade bearing races are machined in the root of the core tube, so saving weight.

The aerofoil shell completely surrounds the core tube, to which it is attached by a brazed copper-silver joint extending the full length of the blade along the camber and pitch faces. A filling of low-density reinforced synthetic material stabilizes the skin against local or secondary vibration and, in addition, provides a high damping-capacity. The blade-tip leading edge is internally strengthened by a copper-alloy fillet to increase resistance to impact.

De-icing is effected by a submerged electrical heater which, being inside the blade, does not occasion an aerodynamic penalty; also, because it is in close contact with the interior surface of the blade envelope, it makes possible a rapid rate of heat transfer and efficient ice removal for a low power consumption. At the root end, the blade is sealed off by a rubber boot, which is moulded in position, and can be formed to fit closely any spinner contour that may be specified.

Both core tube and shell are of high-carbon alloy steel to a D.H. specification. Both are hot-formed independently in the same dies which, being at normal shop temperature, provide the necessary hardening quench by rapid heat conduction through the die surface. A light tempering operation follows the forming process to allow further work to be done without risk of fracture. Final tempering and brazing are combined in a single operation, when both tube and shell are joined in a specially heated die assembly. The brazing alloy chosen has a melting range such as to provide the correct temperature for the optimum physical properties required in the finished blade. This technique of inter-linking the forming processes and the heat treatment prevents the distortion which normally occurs with conventional hardening and tempering methods.

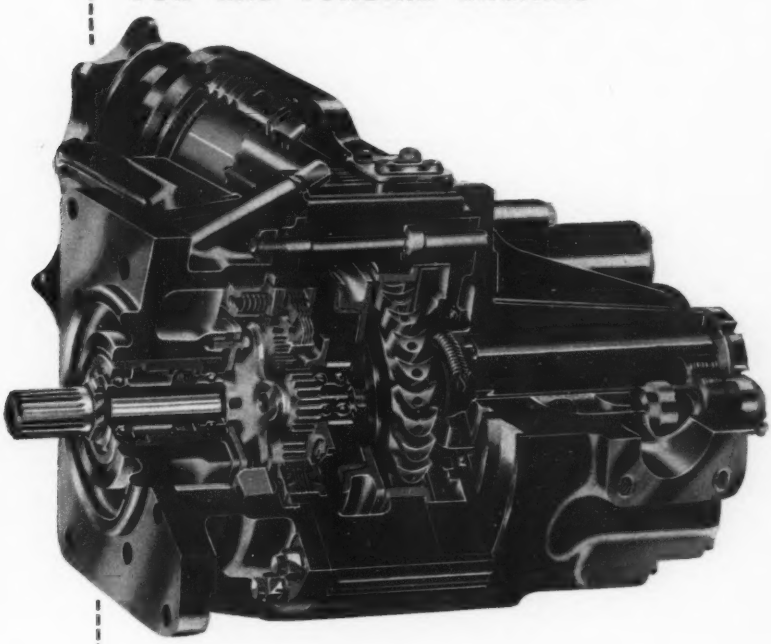
This "ghosted" and part-sectioned view shows the constructional details of the D.H. hollow steel blade.



A = Core-tube
B = Shell
C = Rubber filling of core
D = Moulded barrier
E = Vent
F = Rubber filling of shell
G = Fillet
H = Internal de-icing heater
J = Rubber boot
K = External de-icing heater
L = Internal heater connections
M = External heater connections
N = Seam-weld

A TURBO-STARTER

FOR GAS TURBINE ENGINES



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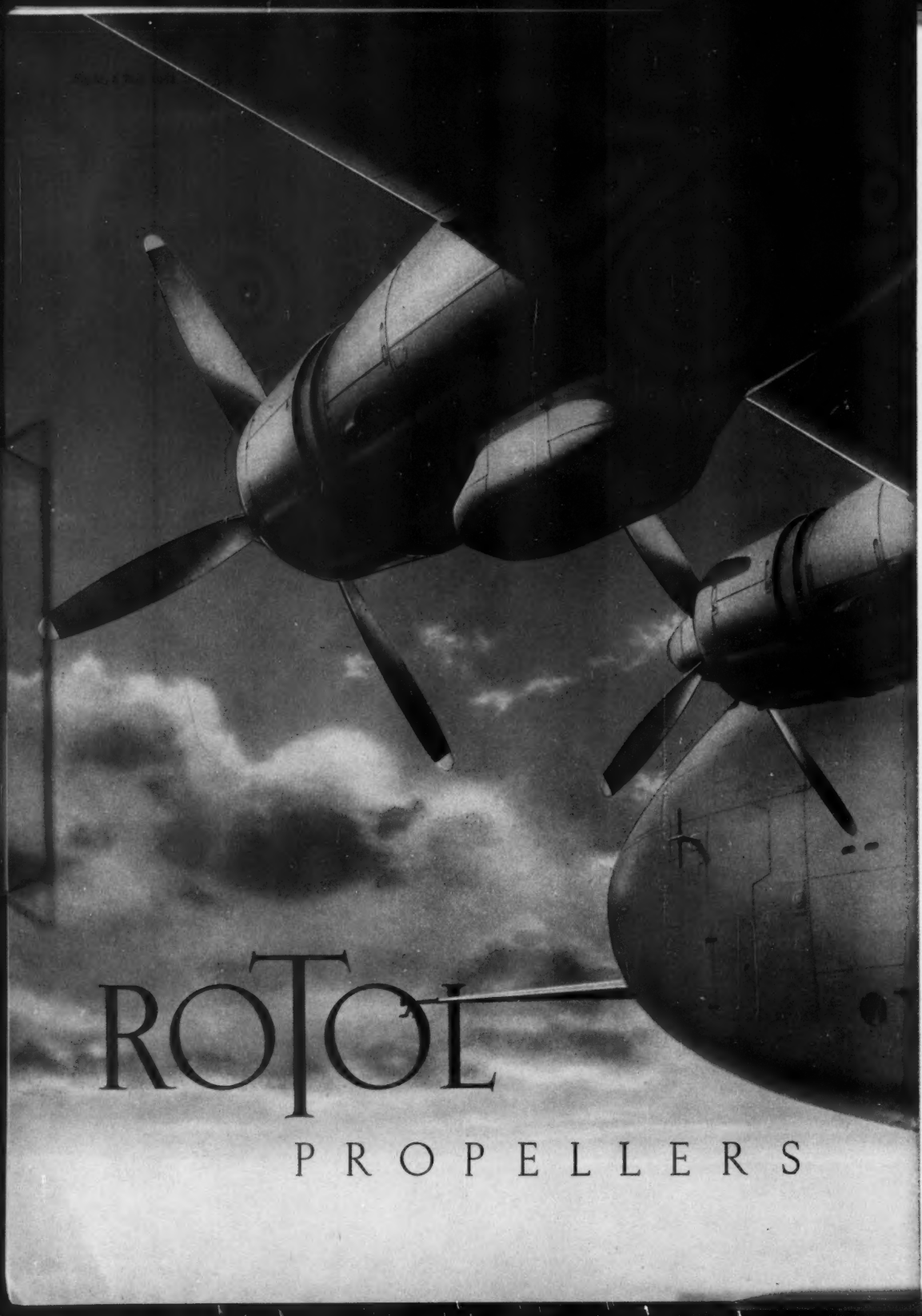
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PROPELLERS

FROM ALL QUARTERS

R.A.E. Director Appointed

IT was announced last week by the Ministry of Supply that Professor A. A. Hall, M.A., F.R.Ae.S., has been appointed Director of the Royal Aircraft Establishment in succession to Mr. W. G. A. Perring, who died last April.

Arnold Alexander Hall was born in Liverpool in April, 1915, and was educated at Alsop High School, Liverpool, and Clare College, Cambridge. He took the Mechanical Sciences Tripos at Cambridge, and received a first-class honours B.A. degree with distinctions in aeronautics, heat engines, applied mechanics and theory of structures. In 1938 he joined the R.A.E. as a scientific officer, and was thereafter engaged on wind-tunnel work and on the development of bomb-sights and gun-sights. In 1945, when a principal scientific officer, he left Farnborough and went to the University of London as Zaharoff Professor of Aviation and head of the Department of Aeronautics of the Imperial College of Science and Technology.

Signalling Turbine Strains

ELECTRONIC strain-gauges have been built into a number of turbine blades in the Derwent turbojets of a Gloster Meteor now flying at the Rolls-Royce flight-test establishment at Hucknall. The gauges are connected to a radio transmitter whereby the strains occuring in the blades are telemetered to the ground and the signals magnetically recorded on a tape. The test pilot can also record his comments on a tape whilst the strains are being registered. Later, the tape records are converted into a picture on a cathode-ray tube; thus, a continuous "graph" of the compound centrifugal and gas bending-loads imposed on the blades can be synchronized with the pilot's commentary.

King's Cup at Farnborough?

THE 1951 Festival of Britain National Air Races, which were to have been held at Hatfield on June 23rd, but had to be postponed owing to weather, are now likely to take place in conjunction with the S.B.A.C. display at Farnborough; Saturday, September 15th, is the date chosen. The events include the King's Cup Race and the R.Ae.C. Jubilee Trophy.

This news was contained in an announcement made after a special meeting of the R.Ae.C. Racing Committee held on June 26th, when various alternative proposals were considered. The R.Ae.C. states that negotiations for the holding of the Races at Farnborough have now begun with representatives of the S.B.A.C., Ministry of Supply, and other authorities concerned.

It is also announced that any competitor who had entered for the National Air Races and who has not entered for the *Daily Express* Challenge Trophy Race at Shoreham on Monday, August 6th, may now apply to enter the latter event provided that the application is received before noon next Monday, July 9th. Owing to the limited size of Shoreham Airport, it may be necessary to restrict the number of additional entries.

Entry fees will be refunded to any competitor who wishes to withdraw his National Air Race entry.

The Club's announcement of these plans ends with the statement: "The Committee of the Royal Aero Club most sincerely appreciates the magnificent sporting spirit with which competitors accepted the bitter disappointment of the cancellation of the National Air Races on June 23rd."

Recollections of the D.G.M.S.

THE luncheon given annually by the British Aviation Insurance Co., Ltd., at Londonderry House has become one of the most popular affairs of its kind, and each year the number of guests increases. On June 29th, the chairman, Sir John Makins, welcomed the guests and in the course of his speech made some amusing references to the insurance of a Widgeon flown in the early days by Air Chief Marshal Sir Ralph Cochrane. He also referred to the outstanding opthalmic work of Air Marshal Sir Philip Livingston, Director General of R.A.F. Medical Services, Air Ministry.

The replies from these, the two guests of honour, were brief and informal, but Sir Philip Livingston mentioned that he would be retiring on the following day "after 32 years with the R.A.F., and two years being sick with the Navy in World War I." He added that in May, 1920, as an acting captain at Donibristle and dressed in one of the choice of four uniforms available to him at that time, he applied for a permanent commission, although at that time there was no such thing. He had not repented his choice of career for ten seconds in his 32 years. It seemed strange now that in the Air Force doctors spent, if anything, more time looking after the fit than after the sick.

Prof. A. A. Hall, whose appointment as Director of the R.A.E. is announced. This photograph was taken at the Tudor Inquiry last year.

Cranfield Prize-giving

SPEAKING at the prize distribution at the College of Aeronautics, Cranfield, last Friday, Air Chief Marshal Sir Edgar Ludlow Hewitt, chairman of the board of governors, referred to recent senior staff departures and said "It is inevitable that staff should leave for industry, but to keep abreast of all developments there must also be a flow of people from industry to the College. The flow of trained men must not be one way only—it must be an interchange. It must be both ways, or sooner or later the supply will dry up." He appealed to representatives of the aircraft industry to support the College in this object.

Vice-Admiral M. J. Mansergh, Fifth Sea Lord, said that the British aircraft industry had always been in the forefront of design and development, particularly in respect of the gas turbine. Referring to the Navy's interest in the air he said, "The Naval air arm at the present and in the unforeseeable future is and will be a most important part of the fleet. The rôle this College is playing in turning out high-grade engineers, on whom we must depend, is of the greatest importance to the Navy."

The Governor's Prize was awarded to Denys John Mead, and the Principal's Prize to Henryk Kazimierz Zienkiewicz.

Esso Chairman Appointed

MR. LEONARD SINCLAIR has been elected chairman and managing director of the Esso Petroleum Co., Ltd., in succession to the late Mr. R. A. Carder. Mr. Sinclair, who is 56 years of age, was born in Manchester and has served the company since 1908. In 1943, he was appointed a director and was made a managing director in 1949.

Mr. Leonard Sinclair, elected chairman and managing director of Esso Petroleum.

It is also announced that Mr. W. E. Jenkins, C.B.E., and Mr. N. F. Myers have been appointed managing directors, and that Mr. H. C. Tett has been appointed a director.

Mr. Jenkins joined the company in 1920 and was appointed a director in 1945. He is 58 years of age and was made a C.B.E. in 1949 for his services as Controller of the Finance and Accounts Division of the Petroleum Board during the war. Mr. Myers, aged 49, is an American and a graduate of the Massachusetts Institute of Technology. He was appointed a director in 1950 and is primarily concerned with the construction and operation of the new Esso Refinery at Fawley. Mr. Tett was formerly managing director of the Esso Development Co. before being appointed general sales manager of Esso Petroleum in 1949. He is 45 years of age.

Commercial Aviation Commentary

By ALLEN GALE

No. 2 of a New Series

ONE of the face-savers which we have grown accustomed to using in this country when explaining away the annual deficits of our national airlines is the argument that U.S. operators only enjoy the prosperity which they do because of the large sums paid to them by the Government for the carriage of the Post Office mail. I have yet to see an accurate evaluation of exactly how the American system of payment compares with our own, but it is admitted in the United States that their system contains a hidden subsidy.

This is recognized by the fact that a Senate committee is currently in the closing stages of an investigation to determine how much of the mail payment can be regarded as fair reward for the carriage of the mail and how much is for other purposes.

Without elaborating on the principles involved one can comment briefly that the American carriers receive mail pay on the basis of so much a ton-mile, the exact sum being determined by the C.A.B. in conjunction with the Post Office, and that this sum varies with the carrier, because the assessment is based on the sum of a number of variables connected with the operation of each individual airline, e.g. operating costs, overheads, etc. Other countries pay operators a lump sum that is not directly related to the amount of mail carried. In this country, payment is based on weight of mail carried, but the assessment of the rate is made with no reference to the operating costs of the airlines; it is, in fact, fixed in conjunction with the rates charged to the public for the carriage of their mail.

* * *

INTO this very contentious subject the news has now been injected that some of the domestic carriers in the U.S.A. are beginning to show substantial profits without taking any account of the mail payments. Figures for 1950 show that American Airlines, for instance, have turned in a profit of $17,002,317 *before* adding mail payment amounting to another $5,915,510, whilst United Air Lines managed to make $6,876,407, excluding mail pay of $7,341,612. If nothing else, these figures show that there is plenty of money to be made in the airline business.

Undoubtedly, as domestic carriers these airlines enjoy special privileges not accorded to such airlines as B.E.A., since their operation is mainly within the confines of their national boundaries and the competition which they have to cope with is at least controlled by the appropriate licensing board—if not, in some cases, eliminated altogether. For these reasons, and for others too involved for discussion here, their mail payments amount to only a very small percentage of their operating revenue, and in the case of the two airlines mentioned the respective figures are given as 5.16 and 7.67 per cent. For international carriers this percentage would be higher, thus increasing dependence on such payments for profit-making. As an example, B.O.A.C.'s mail pay in 1947 amounted to 29.5 per cent of its total revenue.

There can be no question that a system similar to that at present used in America would do a certain amount towards pulling our airlines out of the red; but it would be by no means the complete panacea which it is often cracked up to be. The mail-pay figures for the big airlines in the States are impressive, but one must remember that not all of this is subsidy—and, furthermore, that our own airlines by no means carry the mail for nothing at this time. It is my feeling that we should cease holding on to such excuses as this mail-pay business; the argument there is noticeably thinning, especially since latest information suggests that the whole mail-pay structure in the U.S.A. is likely to be revised shortly.

A FEW years ago someone had the sound idea of establishing the post of civil air attaché in some of our embassies. There was rejoicing in the airline industry when the news got around, because such a man, assuming he knew his stuff, could do an enormous amount of good. There was even more rejoicing when the appointment was announced of the ubiquitous Peter Masefield to the first post in Washington. It seemed as if officialdom had seen the light and the right men were going to get into the right jobs, even though not all the appointments met with universal approval. However, it was not to be expected that Mr. Masefield's exceptional knowledge of civil aviation could be matched and his high standard maintained in every case, and, in fact, the idea has not worked out as well as it might have done.

Now rumour has it that most if not all of the present attachés are to be recalled and replaced by permanent civil servants. Thus does a good idea sink into oblivion.

* * *

THE reopening of the New York to Bermuda service by B.O.A.C. will be welcomed by most people who are interested in British aviation. The closing down of this service in March, 1950, was never fully explained, and as a result one is left with no choice but to form one's own opinions. Certain it is that plenty of traffic existed on that route at the time of B.O.A.C.'s decision to curtail the service and exists today to an ever-increasing extent. By no stretch of the imagination can one call it an uneconomical route and more and more it is becoming less of a seasonal one.

At the original beginning of this service, which goes back to several years before the war, there were only P.A.A. and Imperial Airways in competition with each other. After the war other operators saw the possibilities of the route and entered the field. This inevitably diluted the traffic for the original carriers, but, on the other hand, it also coincided with a big drive by the Bermuda Government to step up tourist traffic. As a result of this official effort, latest figures show that Bermuda holiday traffic from the United States broke all records during the past year. It seems a pity that for this very profitable period B.O.A.C. were not operating the route.

One sympathizes with a company when it finds itself forced to curtail a service because of poor passenger support, but in this case it would seem that the route was clearly not lacking in load potential, so perhaps one's sympathies are not warranted. Assuming that the service was suspended because of insufficient loads, one might say that this was suspiciously like running away in the face of the enemy and would seem to run counter to our best traditions. What is equally upsetting is that at least one independent operator in this country who saw an opportunity of keeping the flag flying (and at the same time making some money) was given no support for his scheme and was greeted with considerable opposition from all concerned. Why this was the case is difficult to imagine, since such a service—provided it was run properly, and in this particular instance there was every reason to suppose that it would be—would have had a big support from the Bermuda Government, if only because it was British. Thus a year and more went by and the other operators profited by our defection.

It is to be hoped that the present service, which is to be thrice weekly to start with, presumably on the grounds of aircraft shortage, will soon be stepped up to a daily rate—as, in fact, it was when it closed down; and also (if it is not too much to expect) that a more up-to-date aircraft from the passenger's point of view than the old 049s will eventually find its way on to this route.

CIVIL AVIATION

B.E.A.'S TURBOPROP FREIGHTERS

WITHIN the next few weeks B.E.A. hope to take delivery of their second and final Dart-Dakota freighter. These aircraft are to be put into service on the Corporation's shorter Continental routes as the freight potential within the confines of the United Kingdom is not likely to provide enough traffic.

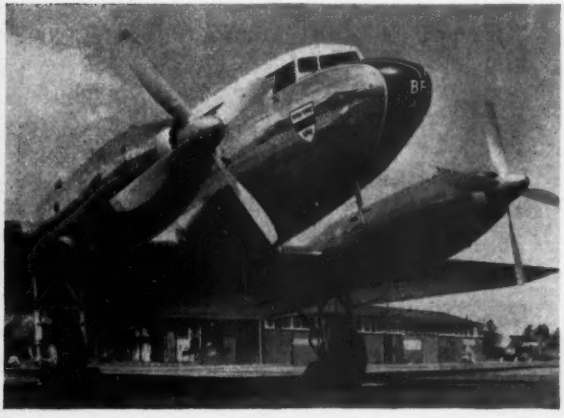
The Corporation's primary object in introducing the Dart-Dakotas is not to make money with them; they are intended to provide experience in operating the Dart turboprop prior to the delivery of Viscounts, and also to give crews a certain degree of familiarization with the power units. The two Dart-powered freighters are not re-engined Pionairs but normal Dakota conversions, all of the work having been undertaken by Rolls-Royce at Hucknall. They are named *Sir Henry Royce* and *Claude Johnson* (the latter name commemorates the man who was Sir Henry Royce's partner in the early days). The power units, Dart 504s rated at 1,400 h.p. (with a 365 lb static thrust) are as nearly as possible identical with the engines to be used in the Viscounts. The only modifications made were those required in order to accommodate the Dart nacelles in the Dakota's wing.

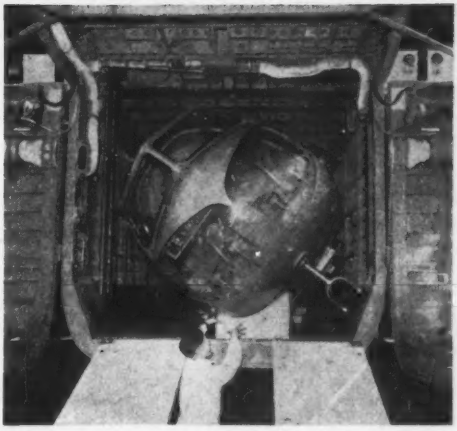
Incidentally, as far as B.E.A.'s Pionairs are concerned, it is now estimated that the delivery programme will be delayed by about eight months. As already reported in these pages, the Corporation has been forced to suspend temporarily its London-Oslo route, place the London-Amsterdam night service in the hands of a charter operator, cancel the Renfrew-Aberdeen and Stornoway-Inverness schedules, and continue operations north of Glasgow and Edinburgh with D.H. 89s instead of the Pionairs.

The latest indications on the delivery of Elizabethans are that the first is likely to arrive in about the middle of August and three should be delivered by the end of September. Introduction into scheduled service is therefore not very likely before mid-October, which means that most of the summer traffic will be missed.

C.A.A. SEATING LIMITATION

THE Civil Aeronautics Administration has established new regulations governing the seating capacity of current American transports. They represent a new approach to the problem of evacuation of an aircraft in the event of emergency. Previously, the seating allowance was based on the fact that a period of 90 sec was required for the complete removal of passengers and crew when the aircraft had its wheels retracted. It has now been decided that the wheels-extended condition must apply; this naturally involves a larger emptying-period, with the result that permissible loads must be reduced. The maximum capacities now permitted for various current types are as follows: Boeing 377, 86; Douglas DC-6, 76; Convair 240, 51; Douglas DC-3, 31; Super DC-3, 35; Douglas DC-4, 83; Lockheed Constellation, 87; Martin 2-0-2, 41; Curtiss C-46, 67.





171 INTO 170=EASILY: A Bristol Freighter was used recently to transport another offspring of the same family—the 171 Mark 3 helicopter—to Khartoum, where it will undergo its tropical trials. Loading was accomplished by mounting the helicopter on a two-wheeled bogie and hauling it into the Freighter by a pulley anchored into the floor of the hold.

NEW D.G.C.A. FOR PAKISTAN

ONE of the first duties of the newly appointed Director-General of Civil Aviation to the Government of Pakistan, Mr. S. J. Stocks, M.I.Mech.E., A.F.R.Ae.S., will be to visit Australia to discuss air-transport matters with representatives of the Department of Civil Aviation. Mr. Stocks, who is well known in the aviation world, served during the first World War in the Royal Flying Corps and subsequently with the Royal Air Force.

He is a specialist in naval aviation, and from 1939 to 1945 served as a liaison officer with aircraft carriers and with flying-boat units of Coastal Command. Between the wars he was flying with Imperial Airways, and shared in the pioneering of the Mediterranean section of the England-Calcutta route. In recent years he has served with the Ministry of Civil Aviation as a Principal Inspector of Aircraft Accidents.

NEW BRUSSELS TERMINAL

THE increasing traffic experienced by Sabena in the last few years has necessitated some reconsideration of the passenger-handling facilities now provided in Brussels, where the existing city terminal has been found to be quite inadequate. Consequently, Sabena have now decided to build a completely new terminal, which will also include the airline's administration offices, freight sections and passenger departure station.

It is to incorporate a special rail terminus, actually an extension of the Brussels Central Station. From the terminus, electric trains will run twice an hour throughout the day (three or four times an hour at peak periods), reaching the airport at Melsbroek in only 15 min. The journey by coach takes 35 min.

The new terminal and railway facilities are expected to be finished in about ten months; they will cost approximately 17,000,000 Belgian francs.

LETTING THEM DOWN LIGHTLY

THE first forced-landing in this country to be made by a helicopter while operating a scheduled passenger service occurred on Wednesday, June 27th, when one of B.E.A.'s S-51s plying between Birmingham and Northolt was compelled, as a result of power failure, to make an autorotative descent near Banbury. The machine was cruising at about 1,000ft at the time and the landing, although heavy, caused relatively little damage. One undercarriage leg was cracked and the tips of both the main rotor and the tail rotor were slightly damaged. The pilot and passengers were unhurt. The helicopter concerned, incidentally, was not one of the Leonides-powered series.

PIONEER: As described on this page, B.E.A.'s two Dart-powered Dakota freighters are expected to go into service shortly. They will thus be the first turboprop aircraft to be used in regular operations. Like B.E.A.'s Pionairs, these two freighters bear names of men prominent in British transport history.

CIVIL AVIATION . . .

An amusing sequel to the incident occurred when the three passengers walked from the helicopter to a nearby hostelry in search of a nerve-soothing drink—to be refused by the landlord on the score that it was outside licensing hours. That, at any rate, is the story told in a Paris newspaper by M. Maurice Simon, who was one of the passengers.

BREVITIES

IN May, for the first time in the Corporation's history, B.O.A.C.'s monthly revenue exceeded £2,500,000. The previous highest total (£2,400,000) was recorded in April.

* * *

Hastings, Sussex, airfield has now been re-opened and Air Kruise, Ltd., who now operate the airport, are undertaking pleasure flights and charters, including an "on demand" connection with their scheduled flights between Lympne and Le Touquet.

* * *

A DC-6 of United Airlines crashed last Sunday on the slopes of a 10,000ft. mountain while on a flight from San Francisco to New York. None of the 50 people on board survived.

* * *

Regular airline flights between Shanghai and Peking have now been started by the newly-formed Soviet-Chinese Aviation Corporation. The company is said to be almost entirely under Russian control, although the Chinese own a 50 per cent share in the capital.

* * *

Trans-Ocean Airlines have initiated domestic passenger flights on a charter basis with two Martin 2-0-2s leased from Northwest Airlines. Schedules are between New York and San Francisco, Los Angeles and Kansas City; "coach" fares are being charged.

* * *

Eastern Air Lines have now finalized arrangements to transfer thirteen Douglas C-54s to the U.S. Navy before the end of the summer. E.A.L. originally acquired seventeen C-54s from the War Assets Administration on a five-year lease. Four machines which had been converted into freighters were recalled for use on the Pacific airlift after the outbreak of the Korean war.

* * *

A report from Athens states that new legislation effecting the complete amalgamation of the three airlines operating in Greece has now been implemented. The Greek National Aviation Company, as the newly constituted airline is to be named, will be managed by Col. S. Zotos, previously manager of T.A.E. The Scottish Aviation interest has been withdrawn.

* * *

The British Travel and Holidays Association is of the opinion that reduced transatlantic fares during the winter months were the main reason for substantial increases in bookings on these routes, particularly by American visitors with personal links in Britain. The Association considers, also, that an extension of the period when cheap fares are available would contribute a great deal to the growth of off-season traffic.

* * *

During a visit to Prestwick Airport last week, the Minister of Civil Aviation, Lord Ogmore, expressed his disappointment at the delay which is now foreseen in starting constructional work on the new runway at the airport. A complete soil survey has now been found necessary, in view of the possibility of subsidence due to underground streams and coal workings on the site of the proposed runway. Work on extending the main runway to 7,000ft should be completed before the autumn.

MAESTRO AND 'MEISTER: Much of the fast-spreading fame of the Rumanian aerobatic ace, Prince Contacuzene (who has already given two of his startling demonstrations in this country) is due to his choice of the agile pre-war Bücker Jungmeister for his act. Additional directional control has been obtained by fitting a sheet-metal extension to the bottom of its rudder. As we reported last week, he flew at Hatfield with some unintentional rudder bias, caused by the extension touching the ground during taxying.

A specially-chartered DC-4 belonging to the Australian operator A.N.A. recently carried 15,000 lb of rubber from Sydney to New Zealand in order to maintain production in a rubber factory at Christchurch during the New Zealand Shipping strike.

* * *

United Air Lines have declared a 75 cent dividend on common stock, the second to be announced by the company in six months. It is claimed to have been made possible by high traffic volumes and high efficiency in operations during the first five months of this year.

* * *

Last Friday a D.H. Comet left London Airport on the most extensive overseas development flight to be undertaken to date. The route being followed is *via* Cairo, Wadi Halfa, Juba, Entebbe and Nairobi, a distance of about 8,000 miles, which will involve approximately 40 hours' flying. The aircraft is due to return to London Airport on Sunday.

* * *

The newly-formed U.S. Airlines Stewards and Stewardesses Corporation is considering a resolution to ask the C.A.A. to include a steward's representative on all accident-investigation boards. The new trade union, which represents more than 3,000 stewardesses and about 350 stewards, recently held its first convention in Chicago.

* * *

I.C.A.O.'s fifth annual trainee programme is due to start on September 17th. Normally six men are chosen each year to spend from three to six months at the Montreal headquarters. During their course the students, all representatives of international aviation departments, are trained to specialize in particular aspects of the organization's work, before returning to their own countries to serve as liaison officers between their own governments and I.C.A.O.

* * *

Aquila Airways, Ltd., have announced that Lord Malcolm Douglas-Hamilton, O.B.E., D.F.C., M.P., is to join their board of directors. Another well-known name to be added to the lengthening list of M.P.s taking an active interest in civil aviation is that of Sir Wavell Wakefield, who has joined the board of the Lancashire Aircraft Corporation. Sir Wavell served in the R.A.F. on flying duties before becoming Parliamentary Private Secretary at the Air Ministry and, later, Director of the Air Training Corps. He is equally well known as a sportsman and is president of the Rugby Football Union.

R.Ae.C. BALL

THOSE interested are reminded that, in connection with the International Invitation Air Rally which is to take place from July 18th to 22nd, the R.Ae.C. has also arranged a ball at Londonderry House for the night of Wednesday, July 18th. Beginning at 9 p.m., the festivities will last until midnight. Tickets (which include a champagne buffet) are £2 10s each and are obtainable from the Royal Aero Club, 119 Piccadilly, London, W.1.

Visitors to the rally itself, incidentally, will arrive at Gatwick on July 18th. Following the ball on the same night, the programme will include a visit to the "Fifty Years of Aviation" display at Hendon, before the guests fly—on Friday, July 20th—in their own aircraft to Sherburn-in-Elmet, near Leeds, to be entertained by the Yorkshire Aeroplane Club.

BRISTOL AIR RACE

THE Bristol Corporation is planning an impressive display programme for the Festival of Britain flying meeting which is to take place at Whitchurch Airport on July 14th. A feature of the afternoon will be the Bristol Air Race, a handicap event open to all piston-engined types of less than 10,000 lb a.u.w. The contest comprises three laps over a 30-mile course; prize money totalling over £225 is being awarded.

It is hoped that the Brabazon will fly during the afternoon and demonstrations are expected by the Bristol 171 helicopter and the Fouga Cyclone. The far-famed Patrouille d'Etampes will be in attendance, and naval aircraft will add a touch of variety with simulated carrier-borne operations. Vampires of 501 (County of Gloucester) Squadron R.Aux.A.F. will also contribute a formation drill item.

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BEHIND the AIR-RACING SCENE

Or, Why Officials Wear Harassed Expressions as well as Armlets

By . . .

B. J. HURREN

ALDERMAN SMOG, the absurdly wealthy, but civic-conscious Mayor of Blacktown, patted his midriff as an old and tried friend and declared : "We'll give lads a coop."

Well, if the story didn't actually start like that it was probably on similar lines in different circumstances. The point is that, once a cup or trophy has been put up for an air race, it marks the beginning of a long and arduous route to the finishing line . . . and after.

Since so few people seem to have even the vaguest notion of the organization and work involved, here is a guide to the behind-the-scenes structure of the average air race. Detail may vary : obviously, more will go into the England-New Zealand Race of 1953 than into an almost private race at any small "Saturday afternoon" airfield. But the whole thing is a matter of degree rather than principle.

Fundamentally, the Royal Aero Club is the responsible body for air racing in Great Britain —and, indeed, for all sporting flying, record attempts, observed flights and so on. It is, in this country, the body solely recognized by the F.A.I. In the Club is a committee, usually termed the Racing Committee, though the official title is "Records, Racing and Competitions Committee." It is this experienced knowledgeable, and hard-worked little band which submits to the Main Committee its recommendations for a race.

Let us examine an important race—just for a lark, we will suppose it is for the Stalin Samovar. This race will be handled by approximately 70 officials, most of whom are professional men, business executives, or Service chiefs in their daily work, but who bring their voluntary aid to organizing a sporting event.

The trunk of the tree of officials is made up of the Stewards. These gentlemen do not dispense drinks : they correspond to a board of directors. Immediately below them (for, like all family trees, this one grows upside-down) is the Chief Executive, and his is really the whole responsibility of the meeting. Normally, for a big meeting, Colonel Rupert Preston, C.B.E., Secretary-General of the Royal Aero Club, would hold this position.

Clerk of the Course

Next come the Chief Judge with his Assistant Judges, who themselves will be assisted by, probably, the Royal Observer Corps. And then comes the most important man in the flying side —the Clerk of the Course. He has control of all flying and ground functions, and at the recent weather-damned races at Hatfield he was Douglas Scoffham, D.F.C., who works in the offices of the Royal Aero Club under Colonel Preston.

The Clerk of the Course is the focal point of three very important officials : (1) The Chief Starter and Timekeeper, (2) The Chief Handicapper, and (3) The Chief Ground Marshal. The last has two major assistants : Deputy Chief Marshal (Starting Line) and Deputy Chief Marshal (Competitors), but there are several other Deputy Marshals—for example, Deputy Marshal (Visiting Aircraft).

Out on the limb we find the Press Secretary, who is directly responsible to the Chief Executive. Similarly, there is the Secretary of the Meeting, whose task is to issue all formal paper-work as set out in the R.Ae.C. Competition Rules.

Note here one important point. Although every pilot must have a valid Pilot's Licence to take part in a meeting he must have also a Competitor's Licence. The withdrawal of this Competitor's Licence is the discipline which the R.Ae.C. can exercise, for without this document the competitor cannot compete.

This then, is the hub of the organization; but obviously there are numerous other officials (M.C.A., Fire, Police, Traffic and so on) who all have an important part.

Long before the meeting is even announced, mole activity is going on. We have, for example, the Stalin Samovar—so where shall the race be held? Light aircraft normally require grass fields, but jets want runways if possible and 1,500 yards as an absolute minimum, with good approaches thrown in. Having found what appears to be a suitable venue, then we must consult the Ministry of Civil Aviation or a municipal authority, or both, and possibly the Aerodrome's Owner Association for good measure.

Next headache is the date. It must not clash with any other F.A.I. function, nor must such things as Army manœuvres, Silverstone, the S.B.A.C. Display and so on be disregarded. Only four months of the year, allowing for holidays and the weather expected, are available, and normally only Saturdays are probables, for obvious reasons. Horse-race meetings and Wakes Weeks are relevant factors.

Then comes the Estimated Cost of the Meeting, with which is coupled Estimated Revenue. Certain costs can be gauged accurately, e.g., cost of Police services; but the Revenue can depend on the accessibility (to the public) of the venue; traffic facilities; parking facilities; and, of course, the Entertainments Tax, since about 49 per cent. of ticket money goes down the national drain.

Assuming all this to have been accomplished, a Course to be Flown has to be decided. The finish must be at low altitude; turning points must be conspicuous; the course may not go over breeding zones or over a chance agricultural show; must avoid radio masts, prohibited areas and smoke belts. Furthermore, it must be personally traversed and inspected—not only are most maps out of date, and newly built housing estates not therefore shown, but map contours are only averaged and there may be high trees at the end of a valley which alter, from a flying racing view, what would otherwise be an acceptable line.

Now multiply all the foregoing by five or six. The reason is that this preliminary work has to be submitted to the Racing Committee, which will then make its choice after examining each proposition in detail. The chosen venue, date, course and general arrangements are then submitted to the Main Committee for approval or otherwise; and thus, weeks or even months, may slip by before the "first announcement" of the proposed race is made.

Once the announcement is made, the preliminary regulations, conditions and closing date for entries declared, then two main lines of work are concerned : the ground organization and the flying organization.

On the ground, the overall layout of the meeting has to be planned, then quotations received. Telephones, public address, fencing, catering, car park, tentage, safety, traffic; these are just a few main headings covering an intricate affair calling for real organizing ability.

On the flying side, seven different forms are required from each entry : these must be scrutinized and accepted or rejected. General headings are : insurance, verification, turning points, marker flares, survey of course, allocation of racing numbers, painting racing numbers, petrol, servicing and maintenance. There were no fewer than 94 scheduled *visiting* aircraft at Hatfield the other week, and with competing aircraft and display aircraft some 180 aircraft, in all—not to mention their pilots—had to be provided for.

Postponement Problems

From the foregoing paragraph it will be seen that it is not a question of a snap of the fingers to postpone a meeting from a Saturday to the following day. Apart from religious factors, the accommodation question alone would be formidable, whilst most telephone facilities and insurance arrangements apply for the chosen day only. The generalization may be made that postponement to the next day means doubling the cost of the meeting without by any means doubling the revenue, because many spectators, once disappointed, are unwilling to try again.

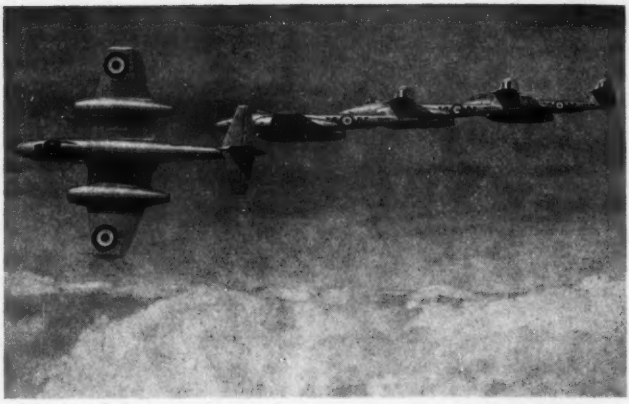
On THE DAY, in the morning, an angry beehive of officials will be buzzing, either in a state of organized disorganization or disorganized organization. Suddenly, as the public address announces the preliminaries to the first event, everything seems to slip into mesh and, in the English fashion, all works well. Only one thing is certain : there will be a party, jubilant or despondent, after the show, and the happy Fellowship of the Air will have notched another treasured memory.

The cups and trophies, insured by the R.Ae.C., will repose far and wide, to be recalled in ten months or so, and a replica provided. And meanwhile, back at headquarters in London, the mole activity for the next series of races has started again, and the circle is complete.

Few can possibly understand the splendid work, especially the routine work, carried on by the clerical staff of the Royal Aero Club and no more than a handful of experts can appreciate the work of the Racing Committee, of which Major R. H. Mayo has been chairman for several years. But I may disclose this : that the minutes of the Racing Committee for the England-New Zealand contest to be held in 1953 already exceed 200,000 words, which is equivalent to three novels in length. That is what is going on behind the racing scene.

SERVICE AVIATION

Royal Air Force and Naval Aviation News



PERFORMERS OVER PARIS: The Meteor 8s of No. 74 Squadron, which gave a formation aerobatic show at last Saturday's air display at Le Bourget. The pilots of the Meteors are: F/L. B. Beard (leader), Sgt. A. Nisbet, F/L. D. L. Edmonds and F/O. P. Wilson.

Honour for R.Aux.A.F. Squadron

HER ROYAL HIGHNESS THE PRINCESS ELIZABETH has accepted the appointment of Honorary Air Commodore of No. 603 (City of Edinburgh) Squadron, R.Aux.A.F. and also of No. 2603 Squadron, R.Aux.A.F. Regt., and No. 3603 Fighter Control Unit, R.Aux.A.F.

Sir William Y. Darling was the previous Hon. Commodore of No. 603. He has resigned after holding the appointment for the past eight years.

No. 603, which is based at Turnhouse, near Edinburgh, is commanded by S/L. P. J. Anson, D.F.C. It is a day-fighter unit and is, at the moment, in the process of being re-equipped with Vampire 5s. The squadron was one of the first Auxiliary Units, having been formed in 1925. In the recent war it had the distinction of bringing down the first enemy aircraft—a Heinkel He 111—to be destroyed over Britain; this was during an action against German raiders over the Firth of Forth in October, 1939.

No.2603 is a light anti-aircraft unit, at present commanded by S/L. C. H. F. Edwards. W/C. M. G. Pearson is C.O. of No. 3603.

At the time of the announcement of Princess Elizabeth's acceptance of this appointment it was also stated that Her Royal Highness would be the inspecting officer at the next passing-out parade at R.A.F. College, Cranwell, on August 1st.

R.N.A.S. Eglinton "At Home"

DESPITE poor weather the "At Home" held at H.M.S. *Gannet*, the Naval Aviation anti-submarine station at Eglinton in Northern Ireland, was well attended.

The air display featured an attack on a mock submarine by 12 locally based Fireflies, led by Lt. Cdr. B. Morris, R.N. Lieutenants Perrett, Rawbone and Black of No. 702 Squadron flew up from Culdrose in Cornwall in their Sea Vampires to give a polished display of aerobatics in formation. They were restricted by cloud at 2,500ft but the crowd was impressed by their take-off, rolls, fast runs across the airfield and landing—all in formation. One loop was attempted, during which the trio vanished quickly into cloud. They came into view again shortly, still in tight formation.

A civil aspect of the display was the demonstration (by Mr. Eassie, of Short Brothers and Harland, Ltd.) of the flying qualities of the Short Sealand amphibian.

R.A.F. Promotions

IN the half-yearly list of promotions Air Marshal A. C. Stevens, A.O.C.-in-C. Coastal Command, and Air Marshal Sir Thomas A. Warne-Browne, A.O.C.-in-C. Maintenance Command, are both confirmed in their rank, as are Air Vice-Marshals R. B. Jordan, A.O.C. No. 25 Group; N. S. Allinson, Director of Manning, Air Ministry; G. D. Harvey, S.A.S.O., Bomber Command; A. D. Gillmore, Commandant R.A.F. Staff College; H. L. Patch, A.O.A. H.Q., F.E.A.F.; J. R. Whitley, A.O.A. H.Q., B.A.F.O.; and V. S. Ewing, Principal Medical Officer, M.E.A.F.

The following Group Captains become Air Commodores: J. L. F. Fuller-Good (seniority January 1st, 1951), G. W. Hayes, J. R. Hallings-Pott, R. C. Field, J. H. T. Simpson, J. N. T. Stephenson, P. D. Cracroft, S. R. Ubee, H. D. McGregor, J. A. Hawkings, W. P. G. Pretty, C. J. Nobbs, H. J. Butler, C. J. Luce, J. H. Harris, A. Harvey, P. B. L. Potter, F. W. P. Dixon.

Moving up to Group Captain are Wing Commanders P. D. Holder (seniority January 1st, 1951), P. W. Bale, M. H. Rhys, K. R. Coates, W. T. F. Wightman, J. G. Glen, J. M. Freeman, D. Michell, A. C. P. Carver, J. N. Tomes, S. J. Marchbank, H. S. Darley, R. E. G. Brittain, P. H. R. Saunders, F. Rump, T. R. Vickers, B. J. R. Roberts, D. F. Macdonald, A. D. Groom, G. S. A. Parnaby, J. R. Gordon-Finlayson, J. D. Melvin, J. C. Millar, W. S. Gardner, E. A. Whiteley, N. A. N. Bray, D. L. Amlot, C. J. Mount, H. M. Russell, H. Stringer, G. N. Hancock, A. R. Morton, S. W. Needham, L. C. Dennis, S. G. Walker, D. H. Wenham, J. S. Carslaw, J. L. Walsh, J. F. Dales, I. Mackay, L. M. Corbet, J. R. Morgan.

Promoted from Squadron Leader to Wing Commander are: I. N. M. Macdonald, T. W. C. Fazan, C. L. C. Roberts, W. A. L. Davis, F. R. Bird, J. H. L. Blout, T. P. Seymour, The Hon. D. H. T. Dowding, W. E. V. Malins, G. J. Bell, J. H. Newberry, D. J. Devitt, G. H. Wherry, K. P. Smales, A. D. Frank, J. R. St. John, B. G. Meharg, P. C. Fletcher, L. W. G. Gill, G. B. Warner, T. L. Bingham-Hall, H. G. Paul, A. G. Wilson, W. T. Brooks, C. N. Foxley-Norris, G. H. Coodman, D. J. A. Roe, H. B. Verity, H. A. S. Disney, A. H. C. Roberts, J. R. Pennington-Legh, D. G. Smallwood, A. C. Deere, J. N. Kentish, J. Barraclough, D. S. Lindsay, C. V. Winn, T. R. Burne, A. M. Ruston, I. N. MacDougall, R. D. Yule, P. de L. Lecheminant, A. H. Humphrey, I. R. Campbell, P. R. Casement, A. H. Burleigh, L. Robinson, A. W. Lindley, W. Cuniffe, G. E. Burtenshaw, A. Cross, R. E. Caesar, A. S. C. Jukes, R. Eve, J. D. M. Sutherland, C. E. Thurston, J. McP. Adams, H. A. Harrison, L. J. Strevens, A. L. Arrow, J. R. Moir, R. P. Norman, T. Thomas, F. E. Bastin, D. K. Morgan, P. J. Lutley, J. D. E. Davies, J. S. Hepburn, B. G. Dickinson, L. R. Mumby, B. J. May, E. A. Darnell, C. R. Iliffe, E. A. L. Wakely, J. B. Connolly, G. L. Lister, C. R. B. Wigfall, J. H. C. Russell, P. G. D. Taylor, R. J. Walker, W. G. Morgan, R. R. Chapman, I. A. J. Edwards-Stuart, J. D. Blois, G. E. Lillywhite, J. Blackburn, A. Richardson, F. J. Mundy, H. L. Roxburgh, J. S. Howitt, W. B. Thorburn, R. J. A. Morris, A. J. Barwood, E. H. Lamb, H. C. Thomas, C. Parmeé, D. M. B. Pitt, P. Crossley.

From Squadron Officer to Wing Officer, W.R.A.F.: F. W. G. Firebrace.

This list of promotions will be continued in the next issue.

H.M.S. "Ocean" Commissioned

HAVING completed her extensive refit at Rosyth dockyard, H.M.S. *Ocean* was commissioned for service in the Mediterranean last week.

The carrier is commanded by Capt. C. L. G. Evans, D.S.O., D.S.C., R.N., who is the first naval operational pilot of the 1939-45 war to captain an aircraft carrier. He is credited with having destroyed 16 enemy aircraft.

The three squadrons of Sea Furies and Fireflies will be No. 807, commanded by Lt. Cdr. A. J. Thompson, D.S.C., R.N., No. 810, by Lt. Cdr. D. E. Johnson, R.N., and No. 898, by Lt. Cdr. T. L. M. Brander, D.S.C., R.N. These units have been undergoing intensive deck-landing training at R.N.A.S. Arbroath.

Naval Decorations

CAPT. A. S. Bolt, who commanded the *Theseus* during operations in Korea, has been awarded the D.S.O. One of the same carrier's pilots, Lt. Cdr. P. G. Smith, receives the D.S.C. A Bar to his D.S.C. is awarded to Cdr. F. Stovin-Bradford, who commanded the air group in *Theseus*. Pilot III R. C. Grant receives the D.S.M.

R.C.A.F. Appointment

THE new air member of the Canadian joint staff in Britain is A. Cdre. Martin Costello. He takes over from A. Cdre. J. L. Hurley, who is returning to Canada after three years in Britain as the senior representative of the R.C.A.F.

The air commodore is no stranger to the United Kingdom—in 1938 he graduated at the R.A.F. Staff College and spent two years with the R.A.F. on Coastal Command duties.

R.C.A.F. Wing in Britain

FOLLOWING Air-Marshal W. A. Curtis's return from the conference of air chiefs of staff in Paris recently, it is reported from Canada that a fighter wing, formed of three Canadian squadrons, will

SERVICE AVIATION . . .

be based in Britain by next summer. No. 421 Squadron, which has been at Odiham for some while, will return home before Christmas.

The announcement was made by Mr. Brooke Claxton, the Defence Minister, who also stated that this was the beginning of an eleven-squadron air division scheduled to be on this side of the Atlantic by some time in 1954.

The first of the new squadrons to arrive will be No. 410, who are now at Montreal, converting to F-86E Sabres.

R.N.V.R. Air Squadrons' Training

THE three fighter squadrons of the R.N.V.R. are doing their annual training at St. Merryn, Cornwall. No. 1832, from Culham, Berkshire, arrived on June 24th, and will remain there until July 8th, when No. 1831 and No. 1833 will take over for the ensuing fortnight.

While in training they will co-operate with regular carrier air groups, carrying out extensive cannon, rocket-firing and dive-bombing exercises.

Australian A.D.C.s Appointed

THE *London Gazette* announces the appointment of three R.A.A.F. officers as honorary Aides-de-Camp to the King. G/C. W. L. Hely, A.F.C., and G/C. W. H. Garing are both regular officers and W/C. R. Kingsford Smith, D.S.O., D.F.C., the third officer to be appointed, is commissioned in the Citizen Air Force. W/C. Smith holds an executive position with de Havilland's Australian company.

May in Malaya

DURING May the bulk of the supply-dropping operations in Malaya were performed by the joint R.A.A.F. and R.N.Z.A.F. Dakota units stationed at Kuala Lumpur, where the recently repaired runway is now in operation. The R.A.F. Dakota squadrons have been withdrawn for conversion to Vickers Valettas.

Supplies totalling 350,000 lb were dropped and communication aircraft carried 500 passengers and 27,000 lb of goods. The helicopter service lifted three casualties from remote jungle clearings.

FOR KOREAN COASTAL PATROLS : Maintenance crews of the F.E.A.F. flying-boat wing servicing the forward gun turret and port inner engine of a Short Sunderland at Iwakuni, Japan. The Sunderlands each do 800 hours before being flown back to Britain for complete overhaul.

Air-Mapping Canada

THE work of air-mapping the whole of Canada by the R.C.A.F. was virtually finished last year, when the summer season was spent completing the survey of the Arctic island area. No. 408 Squadron alone will carry on the work this year, filling in the remaining few blanks and re-photographing those areas where continual change is taking place.

In the first year of operations, 1921, only 280 square miles were photographed, but by 1935, the annual coverage had risen to 109,000 square miles. The project was more or less dropped during the war, but when work began again in 1945, the area covered rose to 242,000 square miles. The most successful year was 1948, when no fewer than 911,000 square miles of territory were recorded. Uncharted islands have been found and places shown to be miles away from their locations as marked on existing maps.

The photographic operations have involved a constant battle against weather. In most cases the work has had to be done during the short seasons when the areas were free of ice and snow. Convection cloud was a major trouble in some areas, cutting the time available for photography down to a few days for a whole summer. An illustrated article on the work appeared in *Flight* on April 6th last.

SOMETHING IN COMMON : Air Marshal Sir Basil Embry, A.O.C.-in-C. Fighter Command, at the recent Royal Observer Corps gathering at Croydon. With him are Observers Clarke and Taylor, who, like Sir Basil, are both escapees from prisoner-of-war camps.

Convoy Exercise

IN the N.A.T.O. convoy exercise "Velox" which lasted for two days of last week, the aircraft carrier H.M.S. *Vengeance* and 15 squadrons of aircraft took part.

"Red" convoys were attacked by "Blue" submarines, E-boats and aircraft of Naval Aviation, and by Belgian, Dutch and U.S. air forces.

R.A.F. Fighter and Coastal Command aircraft, with others of the Belgian and Dutch Air Forces, defended the "Red" convoys.

Whitworth Prizes

TWO Halton apprentices of the 57th Entry have been awarded Whitworth Society prizes. They are P. Large and A. R. Murray, both of whom trained as airframe fitters.

On passing out from Halton they were selected for cadetships and are now studying at the R.A.F. Technical College, Henlow, before entering a university next autumn.

Re-union

A SECOND re-union is proposed for all F.A.A. and R.A.F. personnel who served at the Naval Air Station, Pensacola, Florida. Those who receive no notification are asked to communicate with L. V. Armstrong, 14, Newbury Court, Hermon Hill, Wanstead, E.11.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

PARIS FLASHBACK: One of the postcard views of the first (1909) Paris Show, referred to in the letter on this page from Miss Jean Somerville.

Hatfield "Failure"?

IN view of the weather at Hatfield (and elsewhere) on June 23rd, the organizers were wise to cancel the racing, but with all those machines available they should have been able to dream up some sort of alternative programme. Most of the aircraft could have flown from far smaller fields than Hatfield, and in worse weather.

Here are some of the simple items which could have been arranged to take the place of the racing:-

(1) A fly-past of some of the aircraft (even the Meteor managed to orbit well inside the boundary).
(2) A static display could have been laid on by placing the aircraft in front of the enclosures.
(3) Some well-known pilots, from the many there, could have been interviewed and given some of their reminiscences over the public-address system.

I doubt if there have been many worse examples of failure of organization than we saw on that Saturday.

Birmingham 24. FREDERICK H. COATES.

Winged Automobile

A RECENT issue of your fine magazine has been read from cover to cover by our little group. Your slant on aviation publication is most interesting, though we note that not very much of your space is given over to personal flying. It is this kind of flying that our Aerocar was designed for. The present vehicle is in reality a complete automobile which is just as practical for a trip to the cinema, as you call it in Britain, as it is for a flight to Paris. We are, however, now proposing a military version of the car which has four-wheel auto drive and a flight performance equal to clearing a 50-foot obstacle from a standing start 600 feet away The new version is similar in appearance to the one shown, but has the 190 h.p. Lycoming engine instead of the present 125 h.p. model. The road performance of the military car is quite comparable to that of a jeep and its rough-country capacity is equal to the jeep when the wings are not being towed—although even that unit is quite rugged and capable of rough treatment.

Current civil production of the Aerocar is being delayed due to the national situation. Our own efforts are continuing by modifications to the original machine for better performance and improved durability. The prototype machine has been in service as an automobile over two years and has been flying about a year and a half. Flight performance is quite a bit in excess of the specifications, and our main effort is now directed toward improved durability and service life. We believe we can obtain these features in a mobile aircraft to almost present auto quality.

Longview, Washington. MOULTON B. TAYLOR.

The "roadable" aircraft built by Aerocar, Inc., subject of the letter, above, from Mr. Moulton B. Taylor. Wings and tail are detachable, for towing (on two small wheels) behind the fuselage. There is a pusher airscrew abaft the "V" tailplane.

Flying Through the Grand Canyon

I HARDLY ever write to the papers; this is one of the exceptions. Your photograph of a Balliol flying in the Grand Canyon (in *Flight* of June 15th) is the excuse. I hazard the opinion that the caption is incorrect. The Balliol is not flying at 7,000 ft. just below the lip of the Canyon, but at or about the level of the lip of the Gorge, which is 1,400ft. above the river. The sloping shelf shown in the photograph is the Tonto Shelf, of green shale. The peaks shown in the background are all within the Canyon and rise 3,500ft. above the Tonto Shelf. The top of the Canyon itself is a level tableland at 8,000ft. a.s.l. and has no hills of any kind in the immediate vicinity. All this is true of El Tovar, the chief centre for visitors, and it is more or less true of the whole length of the Canyon.

Having ridden down to the river at the bottom on a mule in 1918 (an unofficial interlude in an aviation mission) and having flown all the way along it from Boulder Dam to El Tovar in 1940, I still think it is the most majestic sight in the world. Incidentally, it is the Colorado River and it is in Arizona, and not Colorado.

Montreal. F. TYMMS.

[Sir Frederick Tymms, K.C.I.E., M.C., F.R.Ae.S., who has conducted numerous important airline surveys and missions since 1918, has been the United Kingdom representative on the council of I.C.A.O. since 1947.—Ed.]

The First Paris Show

WHEN showing the enclosed postcards [one of which is reproduced above—Ed.] to friends at the Paris Air Exhibition last week it was suggested to me that you might be interested to see them. My mother sent them to her family after she had visited the original exhibition in 1909, and the words on the back of one include: "You would have liked to see the aeroplanes of Blériot, Bayard, Wilbur Wright and . . . the first balloon that crossed the Channel, in 1785."

White Waltham, Berks. JEAN SOMERVILLE,
Secretary to Chief Test Pilot, Fairey Aviation Co., Ltd.

FORTHCOMING EVENTS

July	4-11.	F.A.I. Committee Meetings, Brussels.
July	6-9.	Bienne Aviation Club: "Swiss Watch" Rally.
July	7.	Redhill Flying Club: At Home.
July	7.	Aéro-Club de Savoie: Aix-les-Bains Rally.
July	7-8.	R.Ae.C.: Members' La Baule Rally.
July	7-8.	International Wakefield Cup Model Contests, Finland.
July	14.	Bristol Corporation: Air Race Meeting.
July	14.	S.M.A.E. Festival of Britain Model Championships, Wembley
July	15-18.	Royal Danish Aero Club: Rally.
July	15-22.	Aero Club of Italy: International Air Week.
July	16-20.	Aeronautical Union of Jugoslavia: International Parachute-Jumping Competitions.
July	16-21.	Conference on Automatic Control, College of Aeronautics, Cranfield.
July	18.	R.Ae.C.: International Rally Ball.
July	18-22.	R.Ae.C. and Yorkshire Aeroplane Club: International Rally.
July	19-21.	*Daily Express* and R.Ae.C.: International Rally and "Fifty Years of Flying" Display and Exhibition, Hendon.
July	22.	Luton Flying Club: "At Home" (sponsored by A.B.A.C.).
July	22-29.	National Gliding Championships, Camphill Gt. Hucklow, Derbyshire.
July	27-29.	Royal Netherlands Aero Club: Ypenburg Rally.
July	28.	Royal Engineers' Flying Club: Air Day, Rochester.
Aug.	4-5.	Aéro-Club de Touraine: International Rally, Tours, France.
Aug.	6.	*Daily Express* Challenge Trophy International Air Race, Shoreham Airport, Sussex.

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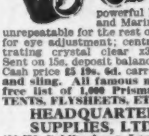

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VACANCIES for draughtsmen and specification technicians as under:—

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k Senior draughtsman, experience in aircraft electrical installation and details.

l Senior draughtsmen, experienced aero engines or auxiliaries, or five years light internal combustion engines.

m Senior draughtsmen, five years' experience in aircraft drawing office for D.I.S. with full knowledge of procedure.

n Junior/intermediate draughtsmen, two to three years' drawing office experience essential.

p Specification writers, experience essential, either in similar capacity or aircraft drawing office or aircraft works technical department. Ability to write technical matter clearly in good English necessary.

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APPLICATIONS are invited for the following positions in the London area:

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JIG and tool draughtsmen required. Previous aircraft experience essential. Pension and life assurance scheme. Apply, Employment Manager, Vickers Armstrongs, Ltd. (Aircraft Section), Weybridge. [0546]

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APPLICATIONS should state full particulars of experience and qualifications and should be addressed to The Personnel Manager, The de Havilland Engine Co., Ltd., Stonegrove, Edgware, Middx. [0575]

SKILLED detail and assembly fitters, turners, borers and millers urgently required.—Apply, giving full details of experience, to Personnel Officer, Westland Aircraft, Ltd., Yeovil, Somerset. [0527]

DESIGNERS and senior and junior draughtsmen for work on gas turbine engines. Midland area. Experience not essential but an advantage.—Apply to Armstrong Siddeley Motors, Coventry. [0018]

APPLICATIONS are invited from stressmen for vacancies with aircraft firm in Midlands. Good salary and prospects for right type of applicants.—Write, stating age, experience, etc., to Box 2538. [0577]

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TECHNICAL authors and illustrators required. Knowledge of M.O.S. procedure desirable. Applications, in writing, stating age, experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds. [0094]

GLOSTER AIRCRAFT Co., Ltd., have vacancies for fully experienced aircraft structural and electrical draughtsmen. Applications in writing, stating age, experience and salary required, to Employment Officer, G.A.C., Ltd., Hucclecote, Glos. [0916]

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GAS turbine aero engine test bed and test rig design and installation. Senior and junior draughtsmen with good general engineering experience required for the above work. Good salaries paid, expenses paid to interview.—Apply: Box 2568. [0560]

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LANCASHIRE AIRCRAFT CORPORATION, Ltd., require fully qualified radio officers at Bovingdon Airport, near Hemel Hempstead, Herts. Commencing salary £650 per annum.—Applications should be sent to Operations Manager, Bovingdon Airport. [0094]

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GOOD intermediate airframe design draughtsman required for interesting new work.—Applications in writing, stating age, experience and salary expected, to Chief Designer, Auster Aircraft, Ltd., Rearsby Aerodrome, Leics. [0476]

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LINK trainer instructor required by The de Havilland Aircraft Co., Ltd., for No. 1 Reserve Flying School. An ex-pilot preferred, but previous Link experience not essential.—Apply, giving full particulars, to Personnel Manager, de Havilland Aircraft Co., Hatfield. [0556]

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METHODS engineers. Applications are invited from engineers with experience of sheet metal details and assemblies. Applicants must have good practical knowledge of modern press shop methods.—Write, stating age and full details of previous experience, to Personnel Manager, de Havilland Aircraft Co., Hatfield. [0555]

DOWTY EQUIPMENT, Ltd., Aircraft Hydraulic Engineers, Arle Court, Cheltenham, require design draughtsmen, preferably with some knowledge of hydraulic and landing gear components for aircraft.—Write: Personnel Manager, giving details of training and experience, and mentioning age and salary range. [0002]

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LANCASHIRE AIRCRAFT CORPORATION, Ltd., require a number of planner rate fixers at Bovingdon Airport, near Hemel Hempstead, Herts., with experience on four-engined aircraft, particularly on Yorks and Merlins. National Joint Council rates and conditions of employment.—Applications to Personnel Manager, Bovingdon Airport. [6593

SAUNDERS-ROE, Ltd., invite applications from all grades of draughtsmen for employment in their aircraft drawing office at Cowes, and from junior draughtsmen for employment in their helicopter division at Eastleigh (Southampton). —Write, stating age, qualifications, experience and salary required, to the Personnel Officer, East Cowes, I.o.W. [6590

A VACANCY exists in the experimental department at Saunders-Roe, Ltd., for a good technician with experience in mechanical and structural testing.—Applicants, who should have the H.N.C. or equivalent qualification, should write, stating age, salary, experience, etc., to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, I.o.W. [6451

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H. M. ROBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [6426

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DRAUGHTSMEN with experience in high quality light mechanical or hydraulic engineering are required by progressive Midland manufacturing company. Positions with good prospects are available to younger men. Salaries will be in accordance with age, qualifications and experience. State details, together with salary required, to Box 2454. [6504

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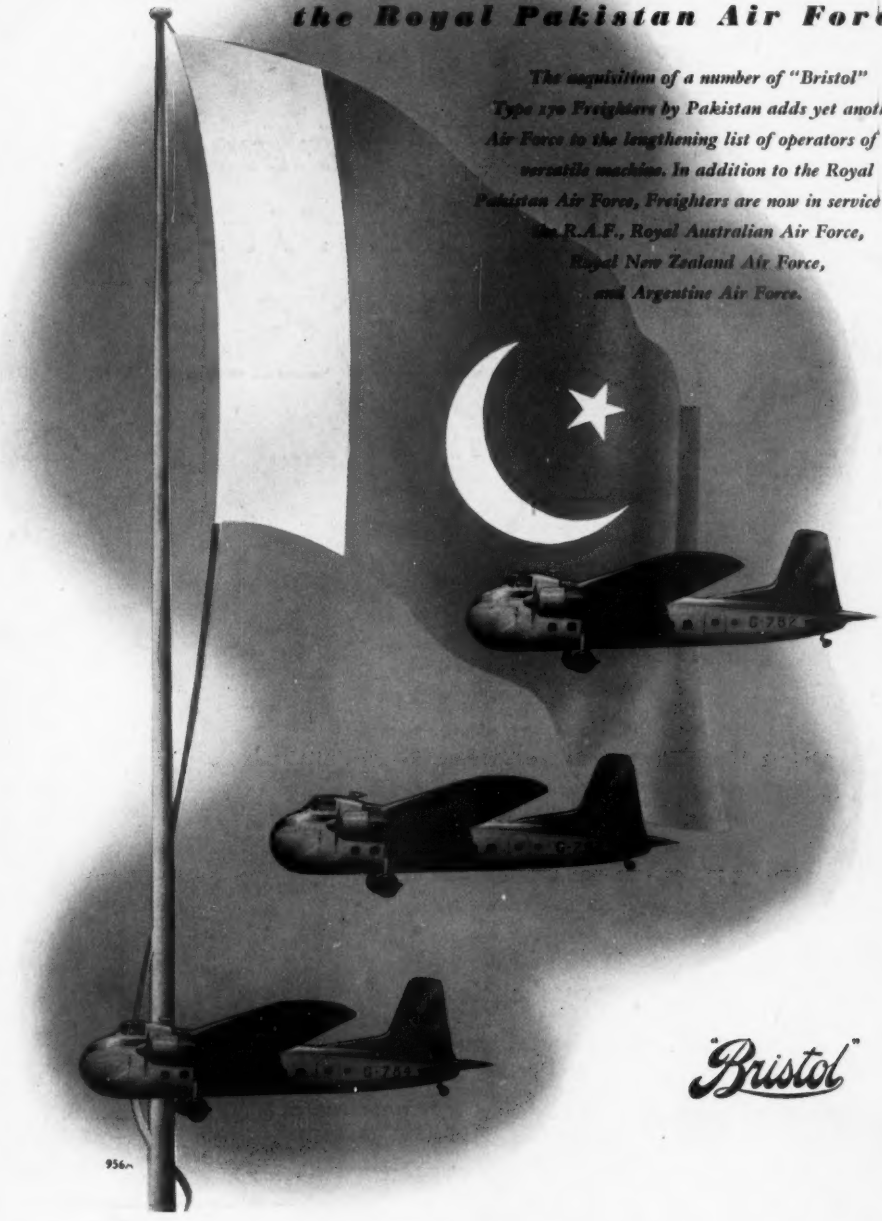

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